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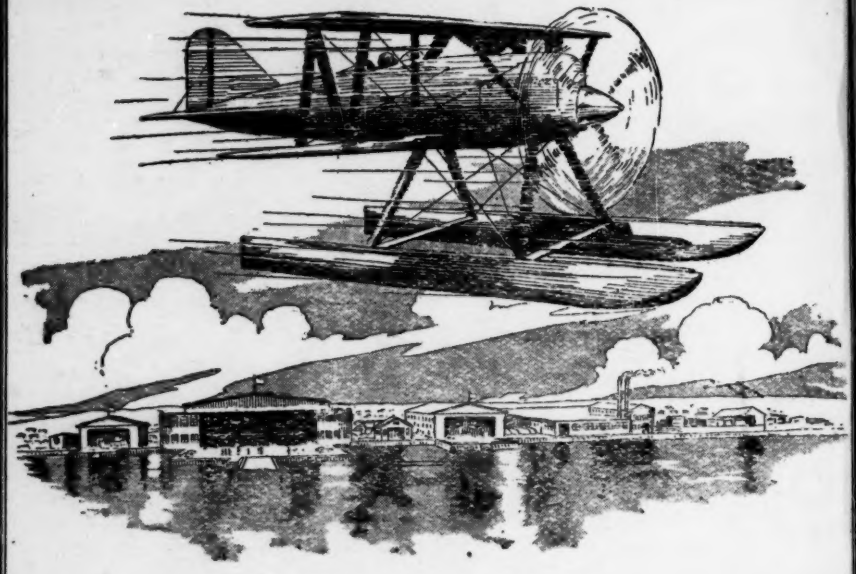

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UNITED STATES
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VOL. NO. 50, NO. 1 JANUARY, 1924 WHOLE NO. 251

# SEA POWER A NATIONAL NECESSITY

BY CAPTAIN DOUGLAS E. DISMUKES, U. S. NAVY

SEA POWER in its true sense consists not only in the nation's armed forces afloat, the Navy, but includes the merchant marine and all the various activities that go to make up our commerce on the sea. *Sea Power,* then, embraces not only the ships, but the men who man them, the industries that build and repair them, the companies that insure them, the docks and warehouses that facilitate loading and unloading them, and last but not least, the great organizations of merchant companies, and shipping companies, ashore at home, and their agents abroad. All these elements of sea power are interrelated, and dependent one upon the other; without the support of one to the other all must sooner or later suffer.

A study of our history shows that during the period wherein we have developed sea power as above defined, we have prospered, and when we have neglected to develop it, we have suffered. We owe the founding and development of the colonies to the sea power of the mother country. Later on sea power of the mother country, unwisely used, was the chief cause of the Revolution and the consequent birth of our nation. The desire to control and monopolize commerce and the repressive measures put into effect to accomplish that policy, were at the bottom of all the oppressive laws that finally forced the colonies to rebellion. On the other hand, the wise measures taken by the Continental Congress to develop our infant sea power and the heroic initiative taken by our naval commanders were largely responsible for the ultimate success of that rebellion.

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V.B.

Without in the least attempting to lessen the importance of the long continued and brave struggles and sacrifices of our people on land in this war, it is probable that ultimate disaster must have befallen us but for the efforts of the brave men that manned our ships and, in defiance of the powerful fleets of the enemy, ventured forth to carry the news of our struggle to the nations of Europe; and to keep open, though in a feeble way, our trade on the high seas.

The daring exploits of our small Navy were largely responsible for the final decision of the French Court to enter the war as our ally. The French people had come to believe that the English were invincible on the seas. No one ever dreamed, until it was repeatedly demonstrated by our Navy, that a British ship could be defeated by a ship of equal power, let alone by a ship of inferior power. The brilliant exploits of our naval commanders, especially those of John Paul Jones, raised anew the hope that the English domination of the seas might yet be broken. John Paul Jones was the hero of the hour in France. The extraordinary public enthusiasm was a great help to Benjamin Franklin in his efforts to induce the French Court to take part in the war. When France finally declared war it was the French fleet, far more than the French troops, that were of value to us. From a critical study of the naval campaigns that followed, no one would claim that that French fleet was used to the best advantage. However, its mere presence in our waters altered the entire course of events to a marked degree. It prevented the enemy from concentrating his army and navy forces in any concerted effort. The enemy fleet was kept busy trying to intercept the French fleet. Prior to the French alliance our own naval forces had never seriously interfered with the major operations of the enemy, simply because we had no fleet. All our efforts were merely in the nature of raids by one or at best a few ships, on the enemy detached vessels, or upon the enemy commerce. With the advent of the French fleet on our side, this condition was changed. In fact, it placed us in a position really to dispute the command of the seas along our own coast. The decisive moment came when Washington was enabled to use this fleet in his master stroke at Yorktown. Without the French fleet the surrender at Yorktown would probably never have taken place.

During the period of our history immediately following the Revolutionary War, most of our troubles resulted directly from the neglect to build up the Navy proportionately to the needs of our commerce. The events of this period show conclusively that without the strong arm of the fighting Navy the activities of commerce and trade on the high seas become a menace, and are almost certain to bring on war. During this period the initiative of our seafaring countrymen rapidly extended our commerce on the sea. The loosely built confederation of states that existed prior to the establishment of our present constitution, and our government some years after our constitution was put into effect, were too weak financially to build up an adequate Navy. Furthermore our leading statesmen at that time looked upon regular armed forces with suspicion. This led them into the error of adopting the other extreme, namely, unpreparedness. The natural result of unpreparedness followed; depredations on our commerce by the French all but brought us into war with that new republic. Without question our weakness in naval power invited this aggression. The fact that France had been our recent ally, together with the strong sentiment throughout the country for the ideals of the French Revolution, in the end averted actual warfare.

We failed to learn the lesson, however, and continued to neglect the only obvious method to prevent war—armed naval preparedness.

In Jefferson's administration, in answer to the growing sense of need for a Navy, the fallacious policy of "the Navy for defense only" was adopted. In line with this idea seagoing ships were neglected, and a large number of small gunboats were built capable of operating in harbors or in closed waters only. In the meantime our commerce on the seas grew apace. Our naval weakness invited aggression, first by the Barbary States and later by Great Britain, in both cases finally leading to war. The policy of Great Britain, in asserting the right of search, impressment of our seamen, and capture of our vessels, was ruthlessly carried out. Public indignation steadily increased as a result of these acts. Our government was forced to take some action. As a corollary to our gunboat policy, we were limited to defensive steps only. The Non-Intercourse Act was passed by Congress.

This act was in effect a law forbidding our merchant ships to go to sea. To enforce this law it actually became necessary to employ our gunboats, not against an enemy, but against our own merchant ships in order to keep them in harbors. The effect, of course, was ruinous to our commerce, and disastrous to our economic life throughout the country. Not only was this law ineffective in accomplishing the desired result, but it rather encouraged the British Government's pretentions on the seas. It is not my purpose in this article to dwell in detail upon the part the Navy took in these wars.

The glorious deeds of the Navy in the War of 1812 will forever be a priceless heritage of our country. The humiliation of our land forces, due to military unpreparedness, was relieved in part by the extraordinary daring and successful exploits of our infant Navy. The fact is, however, that with the exception of Perry's victorious campaign on Lake Erie, our naval victories had but very little effect on the final outcome of the war. In the end our insignificant naval forces were blockaded in our home ports by overwhelmingly superior forces of the enemy. The Treaty of Peace finally signed did not even mention the main question that brought on the war: namely, the right of search and impressment of our seamen on the high seas. Fortunately the victory of Perry on Lake Erie, due to its effect upon the military events in the northwest, had settled the question of the future sovereignty of that great territory, so that this sovereignty was not a subject for serious adverse claim during the peace negotiations. In the long era of peace that followed the War of 1812, our naval policy varied with the changing attitudes of the various administrations; sometimes strong, and sometimes weak. Our commerce grew rapidly, especially in the Far Eastern trade. The Navy became more and more an essential factor in this development. It would be impossible in this article to give in detail all the incidents where the power of the Navy aided this commerce, nor is the Navy's effect on this commerce to be measured by the specific incidents where force was actually used; but rather to be measured by the moral influence resulting from the knowledge that there was such a force, that could be used whenever the rights of our citizens abroad were violated.

One incident, however, of force actually used, may be of in-

terest. In the year 1831 the American merchant ship *Friendship*, lying in the harbor of Quallah Battoo, Island of Sumatra, was attacked by a band of natives. One officer and two of the crew were killed, and the ship looted of its valuables. In those days news traveled slowly, and the report of this outrage did not reach our Government in Washington until seven months later. President Andrew Jackson, "Old Hickory," as soon as he learned of the incident, dispatched the U. S. S. *Potomac*, Commander John Downes, to Quallah Battoo, with instructions to investigate, and if found advisable, to administer summary punishment on the Rajah's government. Upon arrival of the *Potomac* at Quallah Battoo, it was learned that the Rajah himself was the instigator of the attack. Commodore Downes landed a detachment of sailors and marines, captured and destroyed the forts surrounding the town, and obtained lasting guarantees that our ships in the future would be protected.

In those days our merchant ships, backed up by our Navy, carried the flag to all parts of the world. The oriental trade was especially important. Commodore Perry, by the show of naval force coupled with diplomacy, succeeded in making a treaty with Japan, opening up that country to our trade. Then, as now, the great question in the Far East was the "Open Door," which simply means an equal opportunity for all in trade and commerce; one nation on equality with another. The Navy is the only means whereby this equal opportunity can be obtained. The advent of the telegraph and other means of communication has lessened the necessity for having the show of power visibly present. Nevertheless, the knowledge of the potential power due to the strong arm of the Navy is just as necessary now as it was then. This is true not only in our diplomatic councils in regard to the "Open Door" in China, but in all matters whatsoever in our relations with nations of the world.

In the old days our rights were obtained by show of power on the spot; now they are obtained by diplomatic councils held in Washington and in foreign capitals. Where would we stand in these councils without the backing of the potential power of our Navy? This power now may be kept at home, but it is none the less potent. The changes brought about by the substitution of steel and iron ships for wooden ships, and the advent of new

industrial conditions in our country, have acted temporarily to eclipse our commerce on the seas. Unfortunately the greater part of this change in ships took place during the period of our Civil War. Our Navy was required at home, blockading our southern ports, so that a great part of our prestige in commerce on the seas slipped away from us. Special privileges given to European powers, by forced, one-sided treaties, finally all but drove our commerce from the Far Eastern seas. The burdens and debts caused by the Civil War caused a neglect of the Navy for a long period subsequent to 1865. Our commerce declined along with the decline of our Navy. However, during President Cleveland's administration there was an awakening, and there has been a steady improvement ever since; but we have never really attained that position on the seas that our great national destiny unquestionably demands.

The recent war demonstrated the old, old truth, that the nation dominating the sea really controls the world.

At the recent Washington Conference we signed a treaty with the principal maritime powers to limit naval armament, so that on paper we are entitled to a navy in capital ships equal to that of Great Britain. What does that mean, however, unless we really maintain that parity? What does it mean, even with that parity, unless we also develop our commerce on the sea, which is that other great factor making up the sea power of our country?

Without the strong arm of the Navy and the prestige of overseas commerce, our national development, however great it may be, will be one-sided. By the rest of the world we will be looked on merely as a money bag, to be looted and punctured whenever a good opportunity arrives. Our influence around the diplomatic council table will be measured merely by the amount of money that may be extracted from us. That proud feeling held by the strong but righteous man will never be ours. The great destiny of our country demands that we take our place in the front rank of the maritime powers.

# SHALL WE OUTGROW THE PANAMA CANAL?

LIEUTENANT COMMANDER P. V. H. WEEMS, U. S. NAVY

IT IS only recently that the Panama Canal has begun to operate under normal conditions, free from the effects of the World War, and with the slides sufficiently under control to make the operation of the canal continuous. The canal tolls for the fiscal year ending June 30, 1922, amounted to $11,197,832 while the cost of operation was $7,407,998, leaving a net revenue of $3,789,834. Since the present canal commenced to yield a revenue over and above the cost of operation, suggestions have been made by various parties that another canal be dug across the Nicaragua route. While there are arguments in favor of another canal, the need is so remote that the undertaking of another canal at this time would be a poor investment.

It is good business for a manufacturing concern to have the manufacturing facilities expand in proportion to the demand for the articles produced, but it would be poor policy to double these facilities years before the capacity of the original plant is reached. In other words the plant should grow in proportion to the required output and not so far in advance of it as to make the business a poor investment. In the case of the Panama Canal we have only about twenty-five per cent of the possible capacity utilized, yet there is considerable agitation for the construction of another canal doubling the ultimate capacity of the present canal. If we could worry along without any sort of canal until 1914, it seems that we should be able to get along with the greatest canal in the world at least thirty or forty years. Especially is this true when it is known that the possible capacity via the Panama Canal is something like 50,000,000 net tons per year.

Granting that several years would be required for the construction of the Nicaraguan Canal, yet if the capacity of the Panama Canal should be reached in the near future it would mean such a business boom that we could well afford to push the construction of a new canal to the limit regardless of the cost of the work.

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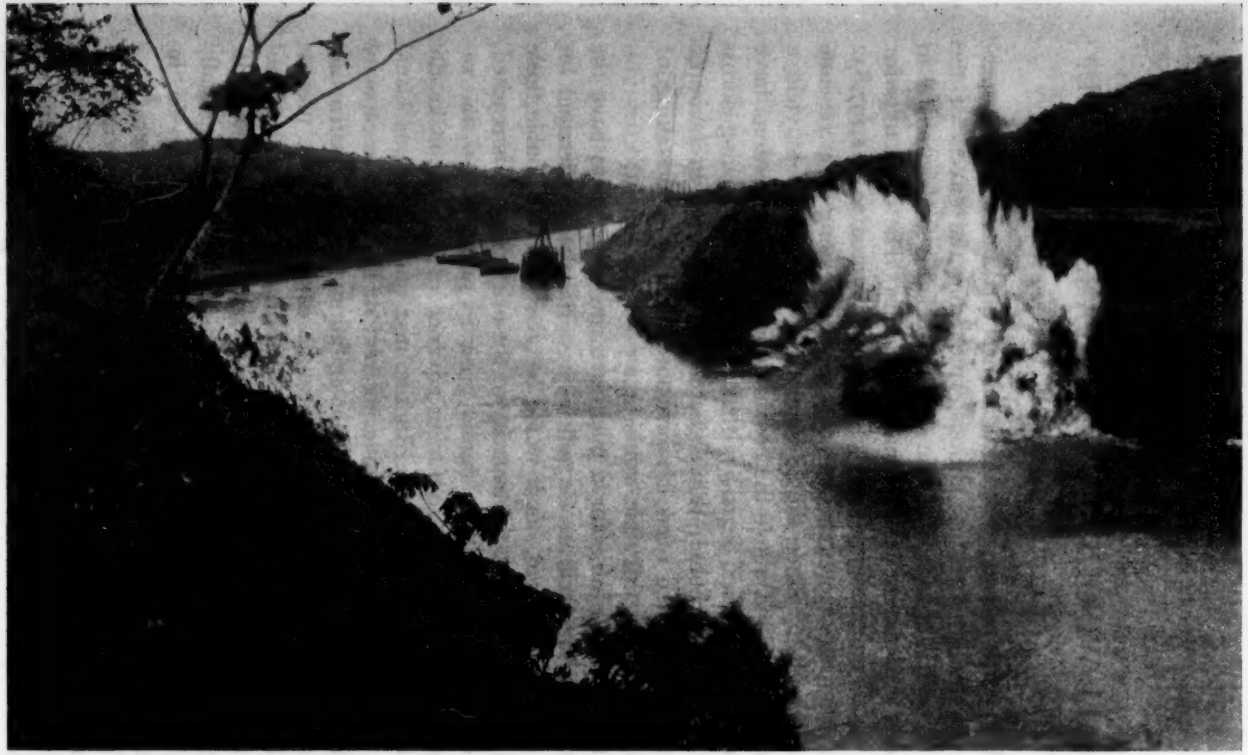
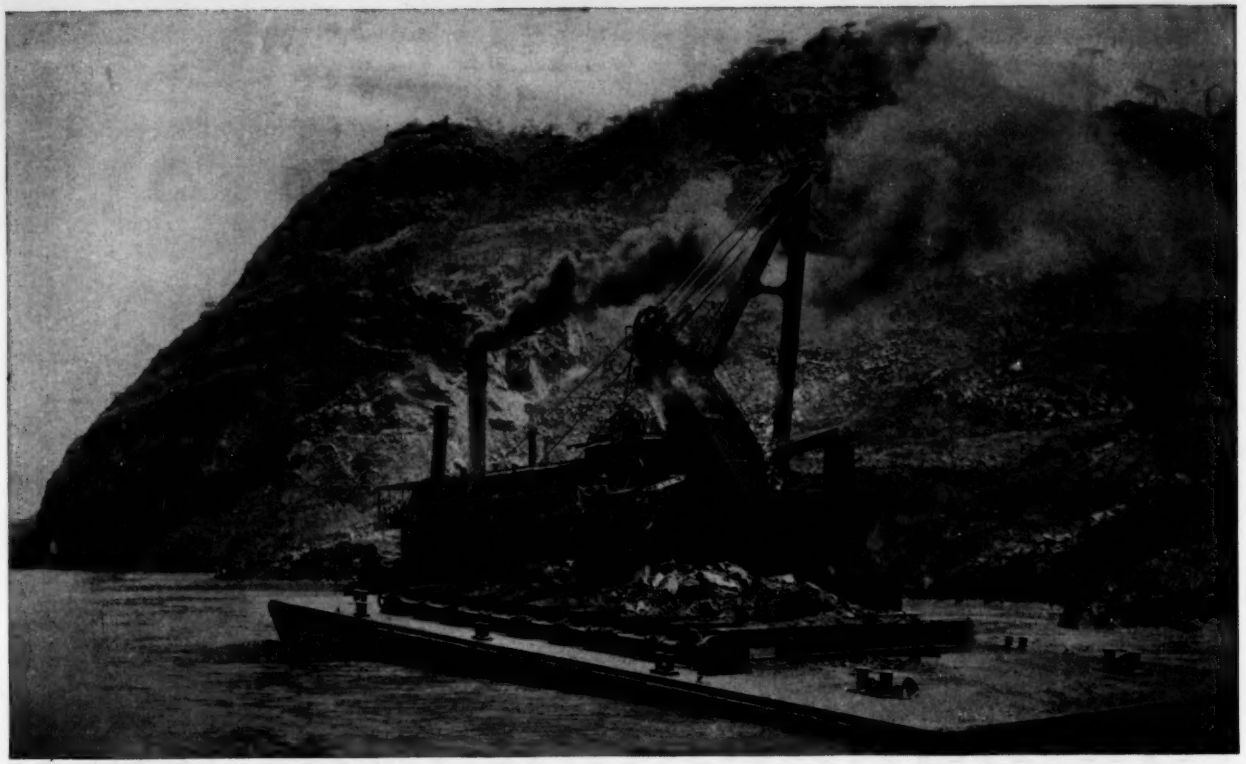


BLASTING AWAY A PORTION OF PITA POINT WHICH CAUSES ONE OF THE SHARP TURNS IN THE CANAL.
This work is not necessary for safe transit by the largest ships, but may be compared to expensive grading work done on railroads to straighten the road. The force employed on this work is available for work removing any slides which might occur.

This, no doubt, would cut the time of construction below the original estimate, and would embarass shipping only a few years if at all. It is far better to invest the relatively small sum in increasing the capacity of the present canal before we undertake the tremendous task of building a new canal.

Some of the principal advantages of a Nicaraguan canal would be: (1) The amount of traffic could be doubled provided there is sufficient shipping; (2) The military advantage of having two routes; (3) Shorter distances via the new route; (4) Preventing any other country from undertaking the construction of such a canal. The principal argument against the canal are the first cost and the fact that the capacity of the present canal can be increased four-fold at relatively small cost. At present about 12,000,000 net tons of shipping pass through the Panama Canal each year. The traffic is handled between 7:00 A. M. and about 10:00 P. M. By continuous operation for the entire twenty-four hours the transits would be increased a proportionate amount. After the capacity of the canal has been reached in regard to the physical operation of handling the traffic, the number of transits might be limited during the dry season to the available water supply. The water from Gatun lake is distributed approximately as follows: fifty per cent through Gatun spill-way; twenty-five per cent for hydro-electric power; eleven per cent to evaporation on the lake surface—164 square miles; eleven per cent for lockages, and three per cent for municipal and other purposes. These figures vary from year to year depending on the run-off and the number of transits through the canal. Either by saving more of the water which is wasted over the spill-way, or by restricting the amount of water employed for hydro-electric purposes, the amount of water for lockages can be increased. The evaporation is nearly constant from year to year, and the amount of water used for municipal and other purposes is negligible. From May to November, which is the wet season, the water supply is greater than needed. The lake is filled to the maximum level of eighty-seven feet above sea level after which the surplus water is wasted over the spill-way. A higher level than eighty-seven feet would flood the motors operating the lock gates. During the dry season, lasting from about December to April, the water supply is not sufficient to maintain the lake level at eighty-seven

BLASTING AWAY A PORTION OF PIA POINT WHICH CROSSES ONE OF THE SHARP TURNS IN THE CHANNEL
This work is not necessary for safe transit by the largest ships, but may be compared to expensive grading work done on railroads to straighten the road. The force employed on this work is available for work removing any slides which might occur.



ABOUT 25,000,000 CUBIC YARDS OF MATERIAL SLID INTO THE CANAL AT GAILLARD CUT (FORMERLY CALLED CULEBRA CUT).
This tremendous slide has been overcome and as an extra precaution a basin has been excavated where further slides might occur, so that this basin will have to be filled up before the Canal proper is obstructed.

feet. During the dry season of 1920 the lake reached the lowest recorded level, eighty-one and seven tenths feet. The minimum level should not be less than seventy-nine feet as this would give a minimum depth in the canal of thirty-nine feet. In order to reduce the amount of water now used for generating power, fuel must be supplied to generate the power, a costly make-shift.

A comprehensive scheme is proposed whereby the greater part of the water now lost through the spill-way may be utilized for lockages. The plan is to construct across the Chagres River at Allahuela, about ten miles up the river from Gamboa, an impounding dam 157 feet high which would raise the level in the storage lake to 227 feet above the sea. The amount of water thus stored during the rainy season would be sufficient to raise the level in Gatun lake three feet, i.e., the amount of water storage would be increased about forty per cent. The estimated cost of the project is about $5,000,000. Since the discharge from the Chagres River is more than half the total water supply of the lake, such a dam would give practically full control of the water supply.

By constructing another set of locks alongside the present ones, making the locks triple instead of double ones, the capacity of the canal would be further increased by fifty per cent. It is estimated that after these proposed alterations have been made the canal can handle 50,000,000 net tons of shipping annually. At present the canal is handling about 12,000,000 net tons annually. In other words by making a comparatively small investment on the present canal, its capacity can be made to handle four times more tonnage than is now being handled. Experts estimate that these improvements will be sufficient for at least thirty years, after which the canal might be outgrown.

Thirty years is a mighty long time. By 1953 air routes may be in competition with the water routes. At any rate any calculations made for thirty years hence have an excellent chance of being thrown out by changing conditions. Even supposing that the canal should draw more shipping than it could handle, the inexorable law of supply and demand could be utilized, and the amount of shipping decreased by increasing the tolls. It would be almost beyond all expectations to have the maximum number of ships sent through the canal with the toll rates raised, say twenty-five per cent.

ABOUT 25,000,000 CUBIC YARDS OF MATERIAL SLID INTO THE CANAL AT GAILLARD CUT (FORMERLY CALLED CULEBRA CUT).
This tremendous slide has been overcome and as an extra precaution a basin has been excavated where further slides coming down that side basin will have to be filled up before the Canal proper is obstructed.

After considering these points it would seem more logical to hold full rights in Nicaragua, but to postpone actual construction of another canal until its need is clearly seen. The reduction in the distances via the Nicaragua route would be comparatively small. The military advantage is an important consideration, yet with a small portion of the amount necessary to build another canal, a force could be built and left on the west coast to compensate for the ships which might be cut off through the destruction of the Panama Canal. If we give due credit to General Goethals' judgment, the danger of complete destruction of the Panama Canal is not so great as some would have it. General Goethals stated that in order to put the canal completely out of commission it would be necessary for the enemy to place bombs behind the gates of the locks, and he wondered what our force would be doing in the meantime. Doubtless the destructiveness of bombs has been greatly increased since the General made this statement, yet the mere dropping of bombs in the vicinity of the locks or spill-ways would not necessarily put the canal out of commission. The solar plexus of the canal, to judge from casual observation which anyone may make who passes through the canal, would seem to be the Miraflores spillway. This could be corrected in large measure by the construction of a second dam near the present one. The construction of a second canal would entail the expense of its defense, and would give the enemy one more outlying point to attack.

From a commercial standpoint, the present canal seems to be a paying proposition. Last year a new accounting system was put into operation. The value of the canal was estimated as for any commercial concern and hereafter the financial reports will be based on the estimated valuation. The canal activities have been divided into three classes: (1) Canal transit property, (2) Canal business property, and (3) Defense capital expenditures. The value of the canal transit property was estimated to be $246,418,990; that of the canal business property, including the docks, repair shops, etc., at $28,760,308, and for defense capital expenditures $110,997,602, making a total of $386,176,900, which was the approximate cost of the canal. The amount of the canal defense expenditures might be said to be the amount the property was written down, in order to place it on a purely commercial basis.

The canal transit property was amortized on the basis of a life for fixed property as 100 years, with allowed interest at three per cent, and with the business property depreciated on the basis of its estimated life. Hereafter if the yearly report shows a revenue above the operating expenses including the annual amortization, the canal is on a sound financial basis, and in 100 years the entire value of the canal would be written off. Of course we hope for even better financial returns, and these hopes are more than justified by recent performance.

However bright the present prospect of the Panama Canal, the expenditure of $300,000,000 in the construction of another canal via the Nicaragua route would appear to be a risky adventure. Let us wait for the day when the capacity of the present canal is reached before we undertake the construction of another canal. By canceling a few "ifs" we would not have the present canal; therefore it seems that we should try to be satisfied, for at least a little while, with what is easily the greatest canal since the world began.

# CO-ORDINATING THE ARMY AND NAVY

By Rear Admiral W. F. Fullam, U. S. Navy, Retired

THE Departments of War and Navy have begun a movement to bring about a closer co-ordination between the two services. This is a matter of the greatest importance. In time of peace it will conduce to economy of expenditure in preventing duplication, and it will prepare the Army and Navy in their peace routine to work together in their war plans toward a common purpose in securing harmony of action in the event of war. It is the essence of preparedness.

This ideal was sought years ago under the administration of President Taft, when an "Army and Navy Joint Board" was first organized with Admiral Dewey at its head. This board was made up of members of the Army General Staff and the Navy General Board, and it began a work that promised substantial results and sensible preparations that would enable the Army and Navy to co-operate promptly and effectively at the first alarm of war.

## Forbidding the Joint Board to Meet

Astonishing as it may seem, however, this vitally important project was nullified in 1915 by an order of the President and the Secretary of the Navy, forbidding any meetings of the joint board. Experts of the Army and Navy could not even convene to discuss the possible emergency of war. They were not permitted to think of the probability of this country being eventually involved in war, although the world had been on fire for more than a year, and it should have been evident that the United States ought, at least, to anticipate such a contingency and not be caught napping. In explanation of this remarkable policy, the statement was subsequently made by the Navy Department, in testimony before the Senate after the World War, that the joint board was not permitted to meet in 1916 because it was feared that the army and naval officers might be encouraged to turn their minds actively

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toward preparations for war. This was considered dangerous.

No parallel can be found in the history of intelligent nations for this complete stifling of our naval and military minds in 1915. These officers were not seeking war. They were quite powerless to precipitate hostilities or to interfere in any manner whatever with the policies of the civil administration. They had no desire to do so. It was a mere organization wisely to safeguard the nation in an emergency—that was all. Organization costs nothing. It is harmless. It is a sensible form of insurance against the pandemonium of unpreparedness. It requires no appropriation of public money. Nevertheless, officers of the Army and Navy were sentenced to sit at their desks in mental and professional idleness, carrying on a daily routine in which there could be no dream of war.

### Making War "Informally"

And, stranger still, this absurd fear of joint Army and Navy activities looking merely to harmonious co-operation continued after we entered the war. A rear admiral and a brigadier general in active command in the Pacific suggested to the Navy Department that joint Army and Navy boards be organized in every seaport of the United States to consider the means to be taken in the event of hostile operations in its vicinity. No matter whether there was any imminent danger or not, such a precaution was manifestly sensible. There were persistent rumors, for instance, that the Germans would send cruising submarines to the Pacific. But the Navy Department turned down the suggestion, saying that such boards could not be officially recognized, but that officers would be permitted to meet "informally" to discuss ways and means. And so we were to make war "informally." Such was the policy of the Navy Department in the spring of 1917.

### An Amusing Incident

That the word "funny" would best describe the situation was subsequently proved. Several months after this common-sense plan had been submitted to the Department and disapproved, a sergeant in Fort Rosecranz at San Diego reported three German submarines off that port. Naturally there was a state of picturesque confusion. There was no co-ordinating plan. There was

no head at San Diego. A half dozen naval and military commanders were there, working zealously at cross purposes in compliance with the Navy Department's scheme of making war "informally," with no well considered organization for an emergency. The wires between the Pacific Coast and Washington were hot with flying messages. The inquiry finally reached the senior naval officer who was in San Francisco at the time,—"Why was there no co-ordination at San Diego?" The answer was given that the files of correspondence for several months would explain the matter—the Navy Department had forbidden the effective organization of joint boards to handle such a situation. This resulted in a change of attitude at Washington. Joint boards were encouraged in the Pacific ports, and the joint Army and Navy board at Washington was subsequently revised and has greatly developed in usefulness since the Armistice.

It transpired that the watchful sergeant had cited three whales spouting along their way up the coast and had mistaken them in the mist or haze for hostile submarines. Of course, the result was excellent. It aroused the Navy Department. This funny incident becomes still funnier when we consider the fact that three spouting whales on an innocent cruise accomplished more in perfecting an ultimate organization for coast defense in the Pacific than the combined efforts of a rear admiral of the Navy and a brigadier general of the Army.

### Army and Navy Air Forces

It is welcome news, therefore, that the country may no longer be dependent upon the appearance of floundering whales off the coast to bring about an organization for defense in which the Army and Navy will act in hearty and effective co-operation. There are many problems to be solved by the two departments in defining the exact duties of each to secure the best results when an enemy appears from across the sea. One of the most important questions is that of the army and naval air forces. The Act of June 5, 1920, provides that: "Hereafter the Army Air Service shall control all aerial operations from land bases and naval aviation shall have control of all aerial operations attached to the fleet, including shore stations whose maintenance is necessary for operations connected with the fleet, for construction and experimentation and for training of personnel."

This wording of the law is not sufficiently wide in its scope and does not explicitly cover the details in the assignment of duty to Army and Navy air forces. The two services necessarily overlap in many particulars, and herein the Army and Navy board must harmonize conflicting claims in order that the Army and Navy may act, as they always should, like a "band of brothers" in any emergency.

### A Sensible Compromise

A disturbing factor in the discussion is found in the suggestion that has been urged by air enthusiasts in favor of a "United Air Service," under an air minister quite independent of the Army and Navy and quite equal in authority to the Secretaries of War and Navy. Such is in effect the condition in England today. But the British Navy takes decided exception to this organization and demands a separation of its air service from that of the Army and civil establishment. A recent discussion in Parliament covers both sides of the controversy, and although the claims of the Navy were admitted to be strong and may ultimately be approved, it was the decision of the British Government to make no change for the present except to give to the Navy a more complete control of its air forces under the general supervisory administration of the air minister.

There are strong reasons for maintaining our air organizations as they now exist until air navigation is further developed. Noting the English experiment and their indecision as to the best solution, it would appear to be the part of wisdom to permit the Army, Navy and civil departments each to perfect and develop its own material and its own activities under a co-ordinating system until the verdict of a few years' experience may demonstrate to Congress the wisdom of a change.

In the meantime, the people of this country have reason to be proud of the records of the Army air service, the Bureau of Naval Aeronautics, and of the air mail service under the Postoffice Department. Each has so splendidly triumphed with small appropriations, inadequate material, and in the astounding absence of all laws for the control of aviation in this country, that we may predict the quick development and wide usefulness of air power in national defense and in commercial life as soon as Congress is awakened to the vital importance of this new force that has come into the world.

# ENGINEERING ECONOMY ON BATTLESHIPS

By Lieutenant Commander R. R. Smith, U. S. Navy

Editor's Note. Lieut. Commander Smith was engineer officer of the *Mississippi*, which in the competition year 1921-22 won the prize for "Greatest Improvement," and in the year 1922-23 stood second in the engineering competition of the battleship class. For that reason the suggestions and recommendations which he makes are entitled to special consideration.

ENGINEERING economy has made great strides within the past three years and some results have been accomplished which are worthy of record. Prior to the war period, the majority of our battleships were burning coal and the burning of coal was developed into quite an art. At best, however, the standby losses in coal-burning boilers were so large that the economies developed could not immediately be recorded in a reduced fuel consumption, and certain other economies could not be practiced because of the requirement that ample fires be maintained at all times to meet possible demands for steam.

The oil-burning battleships constructed prior to 1917 were chiefly concerned with the proper operation of the plants, which were new to most of the officers and men manning these ships. Many of the types of burners then in use have been discontinued and replaced by more satisfactory types, while fuel oil heating equipment has been enlarged and equipment generally standardized.

With the assembling of all of the oil-burning battleships on the West Coast, after the war, and the addition of the *California* and the *Tennessee*, the entire battleship fleet was composed of oil burners with the exception of the *New York* and the *Texas*. There commenced, at this time, an era of healthy competition which developed economical operation to new and unheard of standards, and increased the steaming radius of many of the ships by fifteen to twenty per cent. These economies were possible chiefly because of the flexibility of the oil-burning boiler which

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permits the instant checking of combustion when the demand for steam has ceased.

There is a difference between engineering economy and engineering competition—economy is absolute while competition is relative. Yet, without the competition to spur on the efforts of a ship's company, it is doubtful if the economies could be developed to the point where they become general and of real benefit to the Navy. There are many critics of the engineering competition, but for the most part they have not been acquainted with real benefits which the "competition" has produced. It compels a closer watch upon the plant, its condition, its hours of operation, and its reliability. It is not possible, afloat, to develop a standard cost figure for power, due to the great range in operating conditions, military losses and diversity of types, but the competition does, nevertheless, furnish an excellent auditing system, stimulates the leading ships to intensive efforts and points out the laggards.

The writer recalls making a few mental reservations about a certain engineer officer of a very new battleship who stated that he was burning only ten tons of oil a day in port. Most of the ships at this time were burning thirteen to fourteen tons of oil, which was considered a good showing. After a conference on board we decided that we would try to reach this new low level. Six months later this figure was considered high, with eight and a half tons average, and six to seven tons on a holiday a bottom figure. Before discussing the causes for these improvements, it is desired to point out that engineering efficiency can be obtained without interfering with ship comfort. Probably nothing has prejudiced the minds of officers and men against the competition more than the ill-advised restriction of necessary heat, light and water. This restriction is fully justified only to prevent waste. One turns out the lights in his own home when leaving a room, and it is nothing short of indifference and carelessness which causes an officer to leave four to six lights burning in his room when out of the room. A cold ship is an unhappy ship, and the lack of sufficient fresh water is the cause of more unhappiness that we realize.

The large gains must be made below, and the engineer officer who wishes to have the entire ship's company behind him would do well to consider their comfort.

The factors which make for economy are:

(a) Condition of the plant.
(b) Methods of operation.
(c) Instruction of personnel.
(d) Military and ship factors.
(e) An inspection system for items (a), (b) and (c).

### The Condition of the Plant

The upkeep of the plant has always been an engineering consideration, but upkeep for economy rather than work ability requires a much closer inspection. The burner tip on a Babcock and Wilcox boiler will, for example, always function if not clogged up, and yet this tip, which closely resembles a nickel in size and shape, will if scratched or nicked, become an oil waster. These tips were inspected with a magnifying glass and discarded if not perfect. It has been found that, although water up to a salinity of 300 grains per gallon is permitted in a Babcock and Wilcox boiler, anything over fifty grains causes a noticeable increase in the consumption of oil. Also, nothing is quite so wasteful in a boiler as loose baffles. The excellent condition of the boiler is essential for the best results. Leaky pumps, particularly air pumps, are wasters. Tight valves are essential, for these mean control and without positive control the few per cent between the winner and the runner-up would soon be lost. It is not enough that the plant be in very good condition—it must be more than that, it must be excellent to win. The most effective examination for an auxiliary is to note how slowly it can be run to do its work. A turbo generator designed for 5,000 r.p.m. must have the governor set so carefully that it will not make over this speed. These few examples are cited to show what is meant by upkeep for economy. As a result, there is a second and very important economy which only develops after a ship has been earnestly at the game for a couple of years. It is found that so much less machinery (auxiliaries) is operated that the plant requires fewer repairs. Duplicate machinery is alternated in use, and many pieces of machinery have long periods of idleness.

### Methods of Operation

Herein lies the great field of endeavor for the engineer officer. Due to the constant change of personnel, it is very rare to find

any part of the plant being operated at its best, provided of course that the ship has not been at the top of the list. The place where the largest improvement can be made is the fireroom. "Low air, hot oil, hot feed water and correct burners" should be the slogan. There is much literature on the subject and it need only be adapted to the ship concerned. A ship cannot run smokeless and be economical for the simple reason that once the boilers go beyond the point where a slight haze is emitted from the stack—the economical point—there is nothing to measure how much excess air is being used. It is not alone the steam used in the blowers, but the cooling effect on the boiler and, most of all, the fact that as the air pressure is increased the flames passing through the tube nests are shortened, thereby reducing the effective heating surface. It is safe to say that the excess fuel for running smokeless will amount to from ten to fifteen per cent.

A standard method of operation should be worked out for each station, and when once accepted as the best method should be printed, if possible, otherwise typed, framed and posted at the station. It should state actual pressures and temperatures so that no excuse can be offered by the watch standers. It also serves to preserve the efficient operation of the station against changing personnel. The time selected for testing operating methods and changes should be the midwatch. Nearly all midwatches in port are alike and the same machinery is usually in operation. By shutting down the ice machine for four hours the exact amount of oil which it requires can be ascertained by the saving shown over the previous midwatch. In this way the additional fuel used during any hour of the day can almost always be definitely placed. The same applies at sea, steaming in formation. At this time all variables, such as maneuvering, operation of turrets and large changes of speed, are removed and the operating conditions are very much the same, so that any changes in method can be tried out and the difference in fuel consumption charged to the change. As is to be expected, much higher scores can be made during the night watches than can be made during the day watches, but with the exception of the maneuvering hours the score for any hour of the day bears a very close relation to the same hour of the preceding and following days. This is extremely valuable in making comparisons and in locating losses, and is much better

than comparing the hour with a different hour in the same day's work. This is possible on a cruise of over three days' duration. The score comparison is made rather than the fuel comparison because the standard speed may have been changed one or two knots.

It may be of interest to mention a few of the operating conditions developed which will reduce the fuel consumption. Probably most of them are now in general use, but one or two of these items may prove of benefit to some ship.

### Port Operation

1. *Burners.* From 4 P. M. to 7 A. M. use the smallest tips available. This will require resetting of burners as far out as possible. Lower air pressures can be used but more burners will be required, sometimes all of them. Regulate the steam generated with the pressure of the fuel oil lines rather than cutting burners in and out.

2. *Boiler Pressure.* Drop in port to the lowest pressure possible. This is determined by the highest pressure required for any auxiliary. If the boiler safety valves are set for 275 pounds and the steam for the generators is reduced to 150 pounds and this is the highest pressure required, then drop the pressure on the steam lines and the boiler to 150 pounds.

3. *Blowers.* A great many large blowers may be cut out. The gunnery officer of my last ship was not only willing but requested that magazine blowers be stopped, except for occasional use. He stated that the constant pumping of cold air into the magazines was not good for the powder. This is only practicable when these blowers do not supply other spaces as well. Having served a tour of duty as proving ground officer the statement of this officer has weight.

4. *High Pressure Traps.* All of these were by-passed, and never used. The high pressure drain line under full boiler pressure was run to a high pressure seal close to the feed tanks. If a ship is not so equipped, it should ask for this change as it is worth one ton of oil per day. It consists of a cylinder similar to a kitchen boiler, built to stand boiler pressure. The high pressure drain line runs in at the bottom and a water level is maintained in a guage glass by a discharge valve which connects to the feed tank through a check valve.

5. *Small Turbines.* The second and succeeding nozzles are never used until after the steam throttle valve has been opened wide for the first nozzle. In fire room operation, it has been found that two blowers using one nozzle each are more economical than one blower using two nozzles.

6. *Augmentors.* If a 28-inch vacuum can be maintained on a single generator without augmentor steam, much economy will result. This is possible during periods of light load if the air pumps are in good condition.

7. *Back Pressure.* If the evaporators are operated on exhaust steam there should never be any occasion for operating a condenser. If the back pressure is habitually over fourteen pounds in port, either the auxiliaries are in poor condition (causing excessive speeds in addition to leakage) or too much machinery is in operation at one time. If the back pressure is too high on occasions, look for open valves and hot pumps not in use. If the back pressure is too low, that is, lower than is customary, look to the spring loaded exhaust valves to condensers and for warm condensers. Low back pressure reduces the output of the evaporators and lowers the temperature of the feed water.

8. *Ice Machines.* An intelligent study of ice-box temperatures may permit the ice machine to be stopped four hours per day (midwatch). Ice box temperatures below twenty-four degrees F. are not necessary. A small electric fan on the floor of the meat room will circulate the stagnant air and noticeably drop the temperature. Scrape off the snow and ice occasionally. It is pretty, but remember that Eskimos build houses of snow and ice.

9. *Smoke Watch.* A member of the engineer's force at the smoke indicator can save many gallons of oil by pre-arranged signals, meaning "Too much smoke," "Just right," "Clear stack."

10. *Valves and Flanges.* During the navy yard overhaul, the ship's company should overhaul every valve in the department, for tightness, as this cannot always be done when the ship is operating. Every leaky flange should be repaired as soon as noted, as the loss from this source is very great if allowed to continue. Leaky joints are visible evidence of careless engineering.

## Sea Operation

1. *Firerooms.* It was found more economical to steam with extra boilers than to use just enough boilers to make the standard

speed plus two knots. The use of smaller or middle size tips permits a lower air pressure, and the economy and the efficiency of the boiler is greater when not steaming at full power. As between using six boilers in two firerooms or seven boilers in three firerooms, the former is preferable; but where additional firerooms are not involved, the greater number of boilers is preferable. If all burners are not being used, large tips can be installed in the wing burners for emergency use. It is desirable to shift entirely to the larger tips at 7 A. M. for maneuvers, for although the full speed may be only two knots greater than standard speed in the signal book, the experienced engineer officer will always have an additional two knots available. Closed burners use no oil. There is then less chance of smoking when extra speed is demanded.

2. A smoke watch at sea was maintained in the foretop during daylight hours. A smoke indicator located at this point was modified to show the boiler numbers instead of the descriptive signals, such as "heavy smoke," "light haze," etc. The divisions in the smoke pipe permitted the offending fireroom to be easily identified and by an approximation the actual boiler could be nearly always picked. It usually happens that all boilers in a fireroom smoke at the same time, due to the air control. The advantage of this method is that it does not disturb those boilers where correct combustion is taking place.

3. *Main Turbines.* In velocity or velocity-compounded turbines as few nozzles as possible should be used up to nearly the maximum effective throttle opening. This is determined by the high pressure chest pressure which should be as near the line pressure as possible. If too many nozzles are open the chest pressure is lower for any given throttle opening and the nozzles are not as efficient. To operate in this manner requires an alert personnel, because the men are prone to open extra nozzles to be ready for extra speed at the throttle. There should always be about half a knot on the throttle without touching the nozzles.

4. *Condensing Plant.* The condensing plant is a source of great waste if not watched, owing to the size of the units involved. Where a cross connection is fitted to the air pump suctions, one air pump will handle all condensate for speeds which can be made on slightly over half the boiler power. This is about sixteen to seventeen knots. In determining the lowest point at

which the condensing auxiliaries can be operated, start cutting down the augmentor until it affects the vacuum, then raise it only enough to hold the vacuum, but no more. The same procedure is then followed with the air pump. The speed of the circulator should be governed by the temperature of the injection and the discharge. Where the injection water is around fifty degrees F., it can be discharged at seventy degrees—well below the temperature of any attainable vacuum—but when the injection is about eighty degrees it should be discharged at eighty-five degrees F. or eighty-six degrees F., the temperature of an attainable vacuum. The circulators are run at over twice their normal speeds in the tropics and, when full power is made in the tropics, the vacuum is poor and costly in fuel.

5. *Gland Steam.* This is a source of waste of power and fresh water. Connections should be made to supply this steam from the auxiliary exhaust if possible.

6. *Warming Up.* By the adoption of a printed time schedule for each operation, typed for the actual clock time for that day, much unnecessary idling of machinery can be stopped. By sending copies to all stations each time the ship gets underway, complete understanding and co-operation are insured.

7. *Low Speeds.* The economy of operating on the excess auxiliary exhaust is well known. At low speeds the auxiliary exhaust can be admitted to the first stages of the turbines, and at a speed of four or five knots the main throttles can be entirely closed. The speed thus made is a clear gain as the exhaust would otherwise be discharged to the condensers. The maintaining of the high vacuum on a turbine installation requires the operation of large auxiliaries which cannot be stopped even when the engines are stopped, except when at anchor. If conditions permit, it is more economical to steam at four knots on auxiliary exhaust than to "stand-by" with the engines stopped. The reason for this is that, when the ship is stopped, the excess auxiliary exhaust enters the condenser at a pressure of about fourteen pounds gauge and at a temperature of 248° F. If this steam has been worked through the turbines it will enter the condenser at 77° F. for a twenty-nine-inch vacuum, and will permit the condenser auxiliaries to run at a much slower speed.

8. *General.* In establishing the economical speeds of auxil-

iaries and the economical settings of fireroom equipment, it can be readily seen that speed changes require a complete readjustment. If these changes are frequent it means that for a considerable time, while the changes are taking place, the plant is not running at its economical point. It takes about ten minutes to adjust for economy after a speed change.

9. *One Engine Operation.* If a ship is acting singly, speeds from five to nine knots can be made more economically by using only one side of the plant with from five to seven degrees of rudder. To be of any advantage, the auxiliaries on the stopped side must be shut down. The revolutions required on one engine are approximately fifty per cent more than the average revolutions for any speed for all engines. At about nine knots, the fuel consumption becomes greater and this method of operation is disadvantageous. It can be used, however, if it is desired to repair a leaky condenser while underway. One engine operation while towing targets is very economical. About sixty-five per cent of the normal fuel consumption will be used at five knots.

## Instruction of Personnel

It is one thing to repair the machinery and develop a standard operating practice, but no satisfactory operating condition can long be maintained by the officers alone. It is essential that the intelligent interest of the enlisted men be secured, and the first step in securing their interest is to instruct them. Men do not like "school," much less do they like "inspection." By securing the assistance of the commanding officer, it was arranged that on Saturday morning he would first inspect those engineers due for instruction. They were then marched to the point of instruction, where officers, who had prepared their subjects, talked to them. The instruction given had immediate application to the work in hand. The men were shown burners, registers and tips, and these were explained, set for operation, cleaned and shifted in their presence. Discussions on vacuum or turbines were held for the men in the turbine division. The subjects were numerous, but always of immediate practical interest. The competition rules were explained and a ten-foot blackboard was covered daily with understandable data on the previous day's work. Many officers voluntarily attended these lectures.

### Military and Ship Factors

The interest of the captain, the heads of the departments and the watch officers is essential to win any competition and to promote economy. The captain by his attitude sets the example for all the others. If he lacks interest it will be hard to secure that of the other officers. The captain can help in innumerable ways. I have twice been saved a penalty when the electric circuit breakers blew, by the quickness of the captain in shifting to steam steering without having to fly the breakdown pennant. He can set a convenient speed when acting singly, or he can back less vigorously that he might otherwise do upon anchoring. Some will immediately object to this, saying that it hampers the handling of the ship, but a captain "knows his oil" and is not going to let the competition interfere with the handling of his ship. Let me cite an example of what is meant. A ship may steam for half an hour at eight knots and make one hundred per cent, and on the half hour, shift to a speed of sixteen knots and also make one hundred per cent; but the average for the hour is twelve knots and, because the fuel consumption does not vary directly with the speed, the amount consumed will be far above that allowed for twelve knots and the score for the hour, which cannot be split, will be somewhere around eighty per cent. This, of course, is "competition" rather than economy, but it all counts, and co-operation and understanding help. The first lieutenant can snug up his anchor chain after general quarters when he knows that a second generator is still on the line and is soon to be disconnected. The gunnery officer can come around at 9 A. M. and say that he is not loading that day and that one generator will be enough. The navigator is the engineer officer's best ally at sea and can help in innumerable ways, chiefly by keeping the engineer officer advised of prospective changes.

On the cruise to Panama the deck watch officers staged a good-natured competition between themselves on the score for the watch, and were decorated each day at lunch by the engineer officer who had some spare cloth "Es" used as sleeve marks by the men. In port the watch officer, in co-operation with the engineer on duty, can do much to reduce peak loads. These are costly because they involve starting up units for a short period of time.

The interest of the division commander is a valuable asset. His interest in engineering must beget the interest of his commanding officers, if it does not already exist. One division commander of the battleship squadron placed his four ships, one, two, four and five, in last year's competition. Consider for a moment what this means to our Navy when measured in terms of smart engineering performance and fuel economy. It was not a coincidence, but was accomplished by an attitude of unusual interest, support and encouragement. In this division, engineering was no step-child, but had come into its own.

## Inspections

Every system where detail is important must organize an inspection system to insure the proper execution of these details and to bring under observation any unsatisfactory performances. The inspection of an engineering plant should provide for routine personal inspection and a set of daily and hourly records for each station which can be studied in detail.

The port inspections are made by the duty officer and his assistant, and by one chief machinist's mate, one chief water tender and one chief electrician. Their inspection cover the entire plant and are made as follows: An early morning inspection, an inspection after working hours, an inspection after dinner and a late evening inspection. The subordinates report in person to the duty officer at the specified times at some designated place, usually the log room. At these times operating irregularities are discussed and the causes for excessive fuel consumption determined and corrected. Each officer and duty petty officer inspects in accordance with detailed instructions, which are printed and posted. The fuel consumption is reported hourly and recorded on a form so arranged that a quick comparison with the same hour on preceding days is possible. The day's fuel consumption is kept down by carefully watching the hourly consumption. It is not enough that each day's fuel report be scanned, because the rates of consumption are so markedly different over the different hours of the day that the excesses must be definitely placed. The kilowatt load per hour as shown by the watt hour meters is the quickest means of checking up on the electrical auxiliaries in use.

The quick response of the enlisted personnel is assured when they know that the supervision is active and thorough. It matters not how thoroughly the operating methods have been worked out; if their execution is not constantly checked they will lapse into a careless performance. It is everlasting thoroughness that insures economy and not an occasional fine performance. A gallon of fuel on a midwatch counts for as much as it does on a full power run. By this careful check it is possible quickly to locate the cause of the increased fuel before it runs into a matter of hours. It is the time element which multiplies the excess.

The records should be kept for each station on a daily log sheet designed for that station. It should not be burdensome but should record, at least once an hour, all the useful data; particularly pressures, temperatures and meter readings. It is kept in pencil and not copied. Before being placed on its file in the log room it should pass the inspection of the engineer officer. It should contain nothing but active and important data. The data on these forms furnish the material for suggested operating changes and furnish the engineer officer with a secondary inspection system.

The sea inspection is simpler. At the end of each hour the watch officer collects his fuel-oil meter readings, and with the fuel allowances for the average speed for the hour, works out his score. If he uses the exact allowance the score is one hundred per cent; if the consumption is greater than the allowance, the score is under one hundred per cent. This should be enough to start an investigation as to the cause. It is usually found to be: excess air, low feed water temperatures, cold oil, poor vacuum, or excess speed of auxiliaries. The sea performance as well as the port performance soon becomes so well standardized that the defects stand out prominently in relation to the normal operation of the plant.

The officer of the watch is held accountable for the results attained, and his watch standing, therefore, becomes more than the successful mechanical operating of the plant. It is not possible for the officer of the watch to have all engineering stations under his immediate observation, but if the communication system is well manned the necessary information can be promptly obtained and the watch officer kept fully advised.

## General

As a result of the interest in economy, there have been developed a number of electrically driven auxiliaries for port use, and all capital ships will be equipped with these auxiliaries. Their use is more economical because the water rate of the turbo generators, operating under high vacuum, is very much lower than the direct steam driven auxiliary operating against a back pressure and having a high water rate. The electrical auxiliaries provided for port use are: fire and bilge pump, fuel oil service pump, and boiler feed pump. They are provided with a storage battery, capable of operating them for a reasonable period of time, in the event that the power fails.

The installation of the new low pressure evaporators has proved very satisfactory and is supplying sufficient water for all needs. With the installation of the electrical auxiliaries, however, there is less exhaust steam to operate the evaporators. If the Diesel generators are universally adopted in the Navy there will be no further need for a boiler for port use, and it will be necessary to provide a small donkey boiler for supplying steam to the evaporators, for heating the ship, and for supplying steam for cooking purposes.

The interest in economy has reduced the size of the Navy's fuel bill, has permitted the ships to do more steaming, and has increased the steaming radius of the battle fleet.

# THE NAVAL SERVICE

By Lieutenant Commander H. H. Frost, U. S. Navy

THE efficiency of the Navy depends primarily upon the *esprit de corps* of its officers. This, stripped down to plain language, means "love for the service." It is not enough that we are satisfied with our profession and do the duties we may be required to do. That may develop a good service; it can never create a great one.

The Navy Regulations state that when the executive officer is on board ship "he shall regard himself as always on duty." The only way we can build up a great service is for every officer to regard himself as always on duty. This cannot be ordered by regulations or instructions; it must come of its own accord through love of the service. If we love the service so that its welfare dominates all our thoughts it will then be not a duty but a pleasure for us to consider ourselves as always on duty, always working to advance its interests.

The Navy can be made great only through our work on board ship and ashore. On board ship not all our energies should be used in carrying on the usual routine; all the world and all the other navies are advancing; we cannot afford to stand still; therefore, a part of our work, out of the usual working hours if necessary, should be devoted to original constructive work, so that the Navy will not only advance, but do so at a greater rate than other navies.

Ashore we have also important work to do. The Navy belongs to the people of the country; we are absolutely dependent upon them for our annual appropriations. We will obtain the necessary financial support only so far as the people are convinced of the necessity for having an efficient Navy and that the Navy is utilizing to the best advantage the money appropriated for it. Not only do we need the financial support of the people, but we need their moral support. We need to feel, if we are to do our best

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work, that they appreciate what we are doing, and that they are for the Navy. This support of the people can be gained to some extent through our official associations with the civil authorities, but it will always be our unofficial relations with persons in civil life which will have the greatest effect. All of us, some to a greater extent than others, have opportunities on shore to advance the interests of the service by convincing our friends and associates as to the necessity for an efficient Navy and by showing them how we are all earnestly working to give the country such a service; few people have any conception of Navy life and many believe that we live lives of ease and luxury; the incorrectness of this idea should not be difficult to demonstrate. There is much to be accomplished along these lines for the purpose of increasing the popularity of the Navy throughout the country.

If the officers are contented and devoted to the service, the contentment of the enlisted personnel will be assured; their contentment, which will be communicated to their friends ashore, will have a great effect in increasing the popularity of the Navy.

There must be something unusual when an officer of some years' service does not love the Navy. It would appear that the fault in nearly every case is his own; in some cases it may be partly due to the conditions under which he is serving, but these are always of but temporary duration and should not affect a man who has the strength of character necessary for the proper performance of naval duties.

What other profession can offer us what the Navy does?

Tradition does not amount to much in America, but does it not give all of us a feeling of satisfaction and at least some of us a thrill of pride when we realize that no other naval service can show such a record of accomplishment as ours? What other department in our government or organization in our country, civil, political, financial or industrial, can show a higher percentage of successes in the performance of its duties? Who of us, when he soberly views the situation, is not forced to the conviction that it is a real honor to be a member of such a service and perhaps to have the opportunity some time in the future, if he is prepared to know how to use it, to do something worthy to be added to our old tradition?

The most ardent ambition of real men in past history has

always been to serve their country, regardless of its size, importance, or efficiency. This desire has been the underlying motive for the finest actions in history. Our country could not have achieved its present greatness had not this desire to serve it existed in the hearts of its citizens to a remarkable degree. How may we serve it more loyally or whole-heartedly than in our Navy, where our every action, unimportant though it may seem, is done to make our country secure and to protect its future development into what even the most vivid imagination cannot predict? What we build now in the Navy will last long after we have left it and may have its influence for centuries.

Coming down to a purely practical viewpoint, what other profession can offer the many interesting features of the Navy, either in material or personnel?

As examples from the material viewpoint, take the development of nearly thirty thousand horsepower in the small space allotted to the engineer department of a destroyer; the design of radio apparatus suited for all classes of vessels from battleships to submarines; the solving of the problem of battleship fire control at 25,000 yards range; the development of torpedoes which will run reliably for 12,000 yards; the perfection of the radio compass and under-water listening devices; the design of ships in which the weight allotted to the structure of the ship, the boilers and machinery and the armor and armament must be correctly balanced so as to get the most effective ship for a given displacement.

As examples from the viewpoint of personnel, take the organization of the crew of a battleship about to go into commission; the training of several thousand recruits at a training station; the development of the crew of a submarine where the most perfect co-ordination is necessary so that each man will perform his duties without orders; or the drilling to perfection of the turret crew of a battleship where each man in turn must carry out his part of the operation with speed or precision.

But our life is composed not only of work, interesting though it may be, as in a civil profession, but also of real sport of a character and interest to be found nowhere else in the world.

When a destroyer is standing down the range to fire long range battle practice, is there not as tense a feeling as there is when the players are lining up for the kick-off of a decisive football

game? When finally the whistle goes and the powder flag shoots up to the yard arm, is there not as great a thrill as comes to a football player when the referee's whistle announces that the game is on? And there are not only eleven men in this game, the team is composed of over one hundred. Several times a year, in similar gunnery exercises, each one of us is on the team, playing in one of the most important positions. The gunnery officer and spotter are usually only ensigns. The game is over in a minute. There is no time for anyone to tell these young officers what to do. They are on their own and have a freer hand than a member of a football team who must always listen for his signals. Upon their decisions, for which only a few seconds are allowed, depends the standing of the ship in the practice.

The engineer department is also in the game, and may have an important part to play; perhaps the action of the engineer officer may be the decisive factor in the practice. In a recent practice, consisting of three runs at twenty-five knots, a gasket between the boiler stop valve and the steam drum blew out, partly filling the fireroom with steam, and rendering the heat, previously very great, almost unbearable. Although the men in the fireroom had to be relieved at five minute intervals for over an hour of the practice, all runs were made as usual, and no report of the casualty was made to the bridge until after the last run had been completed.

The full power and smoke prevention runs of a destroyer are gruelling games which test to the limit the spirit and endurance of the engineer division. The requirements are set so high that only a few ships under almost perfect conditions can make the speed necessary for avoiding a penalty. Any comparatively slight casualty may impose so heavy a penalty that the vessel's chance of standing high in the engineering competition for the year will be ruined. On the other hand an alert engineer personnel may greatly reduce the effect of quite a severe casualty. Recently a destroyer, with two hours of a smoke prevention run remaining and running under all four boilers, had the misfortune to blow a boiler tube, which required the cutting out of one boiler. The load was quickly equalized between the remaining three boilers and the required speed was continued; except for twelve minutes at the time of the casualty no smoke was made. This casualty,

which at the time seemed to make the ship a favorite for last place in the squadron, was greatly minimized by the quick action of the engineer division and did not prevent the ship from standing high for this run.

The spirit of sport existing in gunnery exercises is shown by an incident which occurred in a practice which consisted of two runs. On the first run a score approximately fifty per cent better than was ever before made in the Navy was rolled up. Despite the fact that this score was considered almost incredible, the director pointer to fire the second run bet even money that he would better the score of the first run and won his bet.

In aviation we have in the Navy a sport which far exceeds any game in civil life. It has a fascination which anybody who has ever been in the game can never forget. Even beyond the mere delight of flying we have in the Navy such special sports as bomb dropping, torpedo firing and spotting battleship gunfire, none of which are available for civilian flyers.

There is also in handling a submarine a fascination almost equal to flying, and in one respect it is more interesting. One man flies a plane, but thirty-five handle a submarine. In a quick dive or during gun or torpedo firing the captain can give only a few general orders; each man of the crew must do in the right sequence exactly what the captain desires him to do, and must carry out his unspoken orders as exactly as if he could be beside each man, and tell him in detail what to do. Only one man of the thirty-five has to make a mistake to lose the submarine.

In a recent gun practice, in order to save all-important time, the order for the quick dive terminating the practice was given when there remained four shots to be fired from the gun, whose crew had to complete the string, jump down the main hatch and close it before it reached the water level.

What could be more interesting or exciting than driving in a destroyer at twenty-five knots on a dark night through a screen of enemy destroyers, and simulating torpedo fire at 500 yards from the enemy main body; or of taking a submarine through an anti-submarine screen of destroyers to simulate torpedo fire at the large ships of the other side in the maneuver at 300 yards range?

Of course, just as in other sports, the playing of the actual game is not the whole thing. There must be weeks of hard work and training for the game, but with a proper eagerness to excel, which is developed by our forms of competition, this work becomes a part of the game itself; as everybody knows its purpose, it should be, and usually is, entered into with enthusiasm.

In addition to the enjoyment which the Navy offers us along these lines, there is one unique and pleasant feature of Navy life. With what pleasure does a man in civil life keep up his college associations and occasionally meet his classmates in business or clubs! We in the service see nearly every day our classmates and friends of Academy days. We do our daily business with the graduates of our own college. What a wonderful opportunity this gives us for lasting friendships and to be, as Nelson said, "a band of brothers." Such friendships are strengthened and made purer by the fact that they have no connection with financial relations, as do so many friendships of civil life, when for reasons of business it is necessary sometimes to select friends whom we would not desire for purely personal reasons. Who can estimate how much these friendships lasting through our entire naval careers mean to us? It is certain that no estimate in money value can be made of such friendships and that many persons in civil life with unlimited financial resources would envy us them.

People who live on a ship for extended periods come to regard it as their home and to have a love for it far greater than one has for a home on shore. We have all seen the grief of a captain when detached from his command; sometimes even those who would appear to be the least affected by sentiment have tears in their eyes and are unable to say a word. This shows what their ship means to them. This love of the ship extends to all our shipmates and in after years what pleasure is afforded us when we can meet a shipmate, even one who may not have been particularly congenial at the time, and talk over the old times. We have all seen officers of high rank greet with the most hearty affection enlisted men who were their shipmates years before, and it is touching to see the pleasure of retired officers in renewing their association with the service and their old ships. Few of us realize our deep love for the service until we are separated from it. All of us know of officers who have resigned and frankly

admit that it was the most tragic mistake of their lives. After we have grown to know the fascination of the service, nothing else will satisfy us.

We have the opportunity to visit many foreign countries in a way afforded only to those who have independent means at their disposal. From each country we will learn many items of useful knowledge, and in general our minds will be broadened so that things will be recognized in their proper scale of relative importance, and we will be guided by the important things of life rather than by minor details.

We often are privileged to make the acquaintance of important personages of current history, sometimes to watch their methods of work, and possibly even to work with or for them—all to our great advantage.

One of our duties, which should be a pleasure, is the study of the art of war and naval and military history. This trains us in methods which are successful, not only in war, but in our everyday life.

While we can never expect to be rich in the service, we have at least the inestimable advantage of knowing that, as long as we remain in the Navy, we are removed from the fear of poverty. We probably do not know what this means in its full extent, but we all know that a feeling of security is afforded by the knowledge that we are to receive at least a moderate compensation permanently. At least, as regards the financial end of our career, we are playing the game safe, and it appears that this is one game which it is well to play safe, as distinctive from the game of war, where it is the business of the leader to run risks.

In these days we hear many complaints, usually minor ones, about pay. For the conditions which cause these, officials outside the service are responsible. Regardless of the justice of these complaints, it must be remembered that the Navy is not at fault, and it would be unjust to allow our love for the service to be diminished by the acts of persons outside the service.

There is no doubt that for a person of weak character there are many disappointments in naval life. Due to the exigencies of the service many of our hopes are made impossible of realization, and unexepected ship movements or orders to other duty prevent us from carrying through our plans for the future. But a man

who loves the service and who has such a character as would make him desirable for the service should become reconciled to these things. Of course, no one has a character of unlimited strength and sometimes it is difficult to prevent a momentary regret, but it is necessary to realize that service to our country always should come first, and that orders to duty and ship movements should be considered as facts as unalterable as the weather. Personal considerations should never influence our devotion to duty; we must accept with loyalty such duty as may be assigned us. Men who are unable to accept this philosophy have a character unsuited for war operations and reduce the morale of the officer corps during peace time.

No duty assigned to an officer is unimportant. Often duty which first appears undesirable turns out in the end to have been most fortunate. Any duty can be made important provided an officer puts all his energy into it, and makes the most of his opportunities to increase the efficiency of the service. Any duty has possibilities limited only by the amount of energy expended in its performance.

The Navy has made wonderful strides in efficiency since the war; for the first time—in recent years at least—it is being operated in accordance with plans carefully thought out and approved well in advance; at last the fact that preparation for war is our primary peace time duty is being recognized and this principle is receiving not only theoretical consideration but practical application. In fact, the Navy is being built up into a great service—one which, if our present progress continues, is certain to meet any war situation presented to it in such a way that mere equality of numbers, or even approximate equality, need not be considered a requirement of success.

But there are many large problems, particularly in the line of tactics, which still await solution and there are innumerable details to be perfected. Most of this work lies outside the usual routine of duty; it can be accomplished only through the interest and initiative of the individual officer in the development of original ideas for the improvement of methods and material. This interest and initiative have as their underlying motive love of the service.

We also have our tasks ashore in the development of the

popularity of the service among the people, so that their moral and financial support will be assured. This task also can be successful only if we love the service.

Our first duty then is to inspire by word and deed this love of the service, without which the Navy can never be brought to that degree of excellence which we would all desire it to attain.

# FIFTEEN DAYS FOR TRAINING

By Lieutenant Ralph Kelly, U. S. N. F-2 (E. D. O.)

ON AUGUST 2, I received orders to report to the U. S. S. *Langley* at Boston for fifteen days' training in engineering duties. The first requirement was a physical examination by the local naval doctor. After successfully passing that, I reported on board the *Langley* on August 17, 1923.

There was no question which of the ships at the Boston Navy Yard was the *Langley*. A long gray ship covered completely by the flat flying deck, stack on one side, a few planes secured to the deck, no sign of a bridge at first glance, an odd-looking ship, but still not unattractive.

The first day was spent in getting shaken down, looking over the ship and getting acquainted with the officers. The quarters were very comfortable, with the exception of the noise caused by a motor driven potato peeler on the other side of the bulkhead. It commenced operation at 6:30 every morning, and ran intermittently all day. I secretly sympathized with the crew for the frequency with which they were fed potatoes, until one morning there was a procession of them marching up to the officer of the deck with their plates in their hands, complaining because they did not get enough fried potatoes. It has been my experience that noisy quarters are the rule rather than the exception on large naval ships with modern machinery. The boy that took care of the room was in the brig, but that could not be considered as unusual. All in all, my quarters were quite satisfactory.

Besides being the first aircraft carrier, the *Langley* was the first Navy ship to be electrically propelled. The original layout was excellent, and her performance was so good that the Navy Department has made that type of propulsion standard for battleships. There have been practically no changes since the machinery was installed over ten years ago. In spite of the age of the ship, and the fact that she was out of commission for a period before being converted into an air carrier, the machinery is in

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excellent condition; functioning very satisfactorily. Of course, such performance is not automatically obtained, but is the result of constant care and up-keep on the part of the engineering department.

The second day on board, I was agreeably surprised by being assigned active duties in the engineering department. It is not unusual for ships' officers to feel that as long as a reserve officer is on board for only fifteen days, it is not worth while to assign him any regular duties which may interfere with their routine, or cause them any trouble. Conditions on the *Langley* were entirely different. All of the officers were sincerely interested in the reserves, and left nothing undone in their efforts to prepare the various reserve officers on board for duties afloat.

On this day, I was given the day's duty, had charge of the electrical gang, and officiated as Senior Assistant. There is nothing like responsibility for obtaining experience. I soon found myself in the thick of the ship's routine; wondering after every decision which regulation I was violating. I was not cast loose entirely, as there were competent junior officers and chiefs who did not interefere, but who were always available for advice, and always had a weather-eye out to see that the machinery was not wrecked.

I stood day's duty one day in three, and never before realized so fully the multitude of details that arise in the course of a day's work in the engineering department. There were innumerable small repairs to be made, and invariably we were well into a repair before it occurred to me that we had not secured permission to cut off the electricity, or the steam from the galleys or whatever it was that we had shut off.

This type of work was comparatively simple with the well-trained personnel of the engineering department, but the question of liberty and the rights of watch standers was one which was very difficult for me to comprehend. The captain's special liberty orders, the liberty that watch standers rated, and the regular liberty periods, all interfered with the ship's work, and the word became a bugbear when you were trying to make progress on repair jobs. No period of the afternoon seemed free from requests from men for liberty.

The experience with the electrical gang was most interesting

and practical. I had to a great extent forgotten my previous experience in handling a group of enlisted men, with the result that I was practically green when I took this gang over. It consisted of fifteen husky specimens, a couple of them electricians, and the rest merely "rated." They were the blacksheep of the engineering department, and most of them only had a short time remaining to serve. Under the circumstances, there were just about enough men to attend the regular duties of the electrical gang such as dynamo room, exciter platform, gyro and engine room watches; running the movies, maintaining the I. C. system, shop and crane motors, running the searchlights, and attending to the numerous orders from the officer of the deck for minor lighting repairs.

It is the policy of the engineer officer, and one which I strongly favored, to have the ship's force make as many of the ship's repairs and alterations as possible. This policy is not only a great money-saver for the Navy, but gives valuable instruction to the ship's personnel in practical engineering. Only the cost of material is charged against the department for a job completed by the ship's force, which is to a great extent balanced by the increase in skill and knowledge of the personnel. Many of us are familiar with the costs of simple ship jobs when performed by navy yard or shipyard workmen.

The electrical gang were struggling with two ship's jobs when I took charge. One was the installation of an auxiliary lighting system in the fireroom, while the other consisted of wiring a 45 KW. exciter set with necessary switchboard changes, cable runs, etc. These appeared simple, as I looked over the arrangements and assigned men for each job. I was called away shortly after the men had started work. Returning about an hour later, one man out of three was working on one job, and no one on the other job. The chief electrician had released a couple of men in response to a request from the officer-of-the deck, while the other men had adjourned to the electrical shop for lack of some material. I gathered the gang together, located the missing material, and work commenced again. An inspection an hour later resulted in the same condition as before, except that this time some of the men rated a rest because they had stood watch at some previous time.

Then I decided to concentrate on the motor generator set wiring job and abandon the other temporarily. I placed a chief electrician in direct charge of this job, with instructions to detach no man from the work without instructions from me, and to report immediately any delays in the work. Work then proceeded at a fairly satisfactory rate. One day, I missed the chief electrician and found him detailed to direct visitors on deck. Forewarned by this experience, I was able to head off an assignment for shore patrol duty that he was due to serve the next day.

Sometimes, you were thoroughly dissatisfied with the way the men did the work. The hours available for ship's work on a ship are not long, but the men were late starters and early finishers. But again, when an emergency would crop up after hours, you were agreeably surprised at the cheerful way they volunteered to do extra duty. Considering that they turned-to on week-day mornings at 5:30, and the numerous watches they had to stand, you soon acquired more tolerance in dealing with them, and more sympathy toward their requests for liberty.

One morning, the work was delayed because there was only one hack-saw. Upon making a request to the officer in charge of the tool room for an additional hack-saw, I found that enough tools had been issued to equip several ships of this type. The men did not take care of them, and were always short of necessary tools, which naturally caused him to place restrictions on the issuing of tools. However, he issued the extra hack-saw to me, so that our work would not be hampered. Imagine my chagrin the next morning when the extra hack-saw was missing. One of the men had carelessly left it lying on the deck the night before, and it had disappeared. This made me a convert to the strict accounting of tools, and thereafter the electrical gang did their work with one hack-saw.

Every time we got under way, all outside work stopped, so the time was insufficient to complete the job before I left the ship. I did acquire, however, a very valuable experience in dealing with enlisted men, which I never would have acquired in the position of an observer.

While I had the ship's duty, there were all sorts of incidents that arose that were of interest, besides adding to my fund of experience. One of my privileges was to handle the controls of

the ship while getting under way. While struggling to keep the machinery in step with the rapid signals from the bridge, I thought several times of the numerous articles that have appeared recently in the NAVAL INSTITUTE on the desirability of all officers having a working knowledge of the engineering department. Even with the quickest type of maneuvering machinery afloat, it was not possible to keep up with the bridge when they signalled full speed ahead, full speed astern, and two-thirds ahead, as quickly as they could move the telegraph.

One cold night when everything was working smoothly, I turned in at 8:00 o'clock to get a full night's sleep. At 9:00 o'clock, a messenger routed me out, saying the chief engineer wanted to see me. I quickly dressed and was informed there was to be a searchlight display that evening at 11:00 o'clock. I made the necessary preparations and lay down for a one-hour nap. I was awakened again by a loud bugle call, a rush of men and the call of "Fire." I stumbled down to the engine room, reported "Ready" to the bridge, dismissed the men at "Secure," and then it was time for the Searchlight Display.

The flying was wonderful. From the vantage point of the nets attached to the flying-off deck, it was an incomparable sight to see the fliers take off from the deck, swoop down until it seemed as if they would crash into the sea, and then slowly rise and bank for a turn. Then the practice landings, where they would hover over the deck, lightly drop, bounce off and away for another flight. Finally, after the gear had been adjusted, the dropping to the deck, the operation of the gear and the almost miraculous stopping of a fragile plane traveling at fifty miles an hour, in the space of approximately twenty feet without injury to plane or pilot, was indeed wonderful.

One memorable day, we followed the fishermen's race. It was almost calm, but nevertheless the fishing craft footed along at a good speed. The sea off Eastern Point was simply covered with craft of all types, destroyers, mine sweepers, yachts, excursion boats, and the miscellaneous boats of all types that accompany an important race. Fortunately, the commander was a yachting enthusiast, so that the *Langley* was in close touch with the race at all times. It was a striking sight when the boats made the turn, and then ran free with all sail set, almost beside our ship. An

exhibition of flying while under way, and an interesting day was over.

Three years ago, I made a similar cruise on a regular Navy ship, the effect of which did not wear off for some time. It was practically a "Dock" cruise, most of the time being spent in the Hudson River. The duties assigned me were perfunctory, and the only benefit I received from the cruise was my pay. The Navy received nothing in exchange.

On the *Langley,* the officers welcomed me as if I were to be permanently attached to the ship. The engineer officer freely gave me his time, both in and out of hours, in instructing me in his duties and in the daily problems I would encounter. Due to his efforts, I very quickly brushed up on naval matters, and left the ship with full confidence in my ability to assume duties on shipboard. This experience has naturally restored my interest in the Navy, and I again have the feeling that I "belong."

Contrast this training with that of my previous cruise, or with the training cruises described in the September PROCEEDINGS of the Naval Institute.* The usual type of Naval Reserve Cruise is made on small or obsolete types of craft, with an all reserve personnel, and under anything but service conditions. In a great number of cases, there is no discipline, no training, a disproportionate number of officers of varying capability, and the whole affair is unreal and inefficient. No one can say that this type of cruise trains a man to report on board a modern naval ship in time of emergency, and perform the duties corresponding to his rank or rating. If the training of Naval Reserve does not fulfill this purpose, it cannot be considered successful, and the Reserve Forces cannot be classed as efficient.

These cruises cost the Navy Department a large amount of money for pay, uniform allowances and mileage. The Naval Reserve Force has now become small enough so that men with suitable qualifications can be trained efficiently for service on commissioned naval ships with the same expenditure of money.

The essential part of this training should consist of an annual fifteen-day cruise on a regular naval ship of modern design. This cruise should be made obligatory for all Naval Reserve

* Does the Navy need a Naval Reserve Force?" Lieutenant Commander H. R. Bogusch, U. S. N.

personnel. The enlisted men should be merged with the crew, while the officers should be given active duties under the supervision of the regular officers.

The regular officers must co-operate with the department to give the reserves the most intensive training possible in the fifteen-day period. The fitness report of each Reserve Officer should be carefully made out, based on his showing on shipboard, and it should be the duty of the commanding officer, both for the benefit of the Navy and the Reserve Force, unhesitatingly to report upon reserves that are manifestly unfit for the high standards of naval service.

The training of reserves during the year presents more of a problem. Outside of the large seaport or lake towns, it is doubtful if regular drills are of value. Many officers have responsible positions in civilian life which would seriously interfere with regular attendance at drills. In inland towns and scattered districts, it is difficult to bring the men together, or to maintain interest when they do get together. Perhaps the best solution is to make these drills voluntary with some small additional remuneration for those that perform these drills. This might be in the form of retainer pay, which will not be paid those who do not volunteer for the drills.

A well thought out correspondence and problem course would be a valuable aid in maintaining the efficiency of the officer personnel. This is followed out in the Army with very good results. Problems and instruction in navigation, seamanship, ship routine and modern gunnery could be given the deck officers, while problems in ship routine and the modern developments of marine engineering could be given the engineering officers. It would do no harm to give the engineer officers instruction in navigation and gunnery, as practically all of them follow the engineering profession in civil life.

No one can deny that there should be a radical change in the training of Naval Reserves to make them efficient for duty afloat. The essence of that training should be service on modern naval ships under service conditions. A few men well trained for active duty are of immensely more value to the Navy than a Naval Reserve which consists of numbers only.

The present system is not only deficient in the training of the personnel, but tends to cause capable men to lose interest and drop out. Why not abandon the present recognized inefficient system of training, and adopt one more suited to naval requirements?

# POSTGRADUATE INSTRUCTION

By Commander Alexander Sharp, U. S. Navy

THE object of this paper is to outline the postgraduate course in technical subjects and to show its value to the service.

The time is opportune to present this subject, for nothing has been written for a number of years and in that time the course has progressed.

The training of naval officers has received a great impetus since the war. A training division has been established in the Bureau of Navigation to have complete charge and direction of naval education and considerable has been written on the subject in the service papers and the newspapers.

It has been sometimes erroneously believed that because an officer has taken the postgraduate course he is limited to a specialty thereafter. That is not the case. If on account of special aptitude, however, an officer elects to go in for design work as a career, that is his own concern. Research work and design are important fields for a limited number.

Completion of the postgraduate course in an engineering or other specialty in no way unfits an officer for regular line duties, but on the contrary it has been found to be a great asset in the performance of line duties of any kind.

All junior officers of the service would be benefited if they were required to take the course; at present it is elective only.

## Technical Engineering Training a Necessity

That technical engineering training is a necessity for all naval officers is certain. "Engineering" is here used in its broadest sense. It does not mean marine engineering alone, but it includes ordnance, mechanical, electrical, radio, aviation engineering. A dictionary definition is, "The art or science by which the mechanical properties of matter are utilized in structures and

[Copyright: U. S. Naval Institute, Annapolis, Md.]

machines . . . . " In civil life the term *engineer* has gained a new significance. It is no longer synonymous with that of "mechanic." Someone has aptly stated that "an engineer is a man who can do with one dollar what anyone else can do with two."

Rear Admiral J. K. Robison, U.S.N., in his article on "The Part of Engineering in Command," in the February, 1923, number of the Naval Institute PROCEEDINGS, shows the necessity for engineering training in the Navy. In part he says: "The efficiency of the Navy depends upon the acceptance of the principles that operation and maintenance of machinery afloat is a function of the regular line officer. Every line officer must be made capable by proper training to perform engineering duty commensurate with his rank. The officers selected in accordance with the authorization of law for 'engineering duty only' provide the expert technicists required for engineering design and inspection,—but it is not intended, nor is it well, that these officers should supplant the regular line officers in the operation and maintenance of machinery afloat. Our Navy possesses a distinct advantage over other navies of the world, in that our regular line officers receive training in engineering, and the application of the principles of that science constitutes an important part of their duties." " . . . . it should be noted that the duty of an officer on board a modern battleship in every department, requires an accurate comprehension of the principles of engineering in its broadest sense."

The advances made in science are reflected in the development of the Navy, and to keep pace with developments naval officers will have to be very familiar with the basic principles of science. Furthermore an entire dependence on technical civilian help for developments in the Navy is not desirable. Naval officers are required to direct and control the application of science to naval warfare, and they cannot do so intelligently without a sound education in engineering fundamentals. Progress in the Navy is limited by the knowledge of its officers. It seems obvious that the quality of service rendered by junior officers will be improved if more of them receive technical training. It appears probable also that the question of detail to different forms of duty would be considerably simplified if all had a good fundamental technical training.

All engineering principles are basicly the same. Physics lies at the bottom of all engineering. A recognized educator has stated that if he were given a class of college graduates well founded in physics he could develop them into many different kinds of engineers in a year. The moral to be drawn from this is that attention to fundamentals lays the foundation for proficiency in not only one specialty but in many specialties. The mastery of one specialty gives a sympathetic understanding of other specialties and clears away much of the mystery that previously surrounded them. On the other hand it probably will always be necessary to have a few officers especially trained in design.

The Naval Academy gives a course in elementary engineering theory and practice sufficient to start the junior officer on his way in the service. The Naval Academy is, however, not essentially an engineering college. The time available is too short and the requirements of the embryo naval officer are too numerous to permit his receiving the equivalent of the standard four-year undergraduate course of a civilian engineering institution.

Subsequent duty afloat cannot afford sufficient educational facilities to replace a sound postgraduate course ashore. Both are necessary to secure the best results.

## History of the Postgraduate School

The Postgraduate School was established at the Naval Academy in 1909 as a school of "Marine Engineering." Students chose specialties under engineering and consulted a technical library in order to obtain information. It was found that they were hampered in their education in mathematics, mechanics, thermodynamics, etc., and to meet the demand for training in fundamental theory a system of lectures was introduced.

In 1912 the title of the school was changed to "Postgraduate Department" of the U. S. Naval Academy, and its field was enlarged to include postgraduate work of naval constructors, ordnance, electrical, radio and civil engineers.

In the evolution of the school it was found necessary to establish resident professors with a definite schedule of lectures, laboratory work and preparation. The predominant service opinion was that headquarters of the school should be at Annapolis and

that after one year's work there the student officers should be sent to universities not under naval control. This was for the purpose of broadening their viewpoint by contact with civilians and to permit of the utilization of those universities which offered the best facilities in the several specialties. It was deemed essential to maintain the first part of the course under the direct control of naval officers to permit close observation of the students during the important period of indoctrination which is found necessary. Other considerations were the availability of well-equipped laboratories and the proximity of the Naval Engineering Experiment Station.

Advantage has been taken of the counsel of experts in engineering education to develop the postgraduate course. A committee of representative educators appointed by the Secretary in 1916 studied the special problem and their recommendations have been embodied in the course.

By gradual evolution the course has come to consist of one year at the Postgraduate School at Annapolis, followed by a summer's practical work and eight months at a university and concluded by another summer of practical work.

Bureau of Navigation Manual, Part C, Chapter I describes the postgraduate course in general, its administration, and the functions of the Postgraduate Council.

In 1920 a board was appointed by the Bureau of Navigation to recommend regarding the instruction and training of line officers. The board's report, which was published in the August, 1920, number of the Naval Institute PROCEEDINGS, placed emphasis upon specialization and divided all line officers into five main groups for the purpose of accomplishing this object. The plan of the board was to initiate a "general line course." It also provided for officer instruction in four phases: viz., at the Naval Academy, the general line course, the junior war college course, and the senior war college course. The recommendations of the board were never put into effect.

The effect of this board's report has been probably to give impetus to the recent movement to establish a junior course at the War College. With equal consistency it should be regarded also as giving emphasis to the necessity for a course of technical instruction, as now standardized at the Postgraduate School. It

is hoped that a combined course suited to the needs of all junior officers may be the outgrowth.

The Postgraduate School does not aim to give a course in "operating" engineering. Operating engineering, it is apparent, can only be satisfactorily learned at sea. The grounding in fundamental principles given at the Postgraduate School, however, forms a valuable contribution toward the making of a competent and intelligent "operator" in any of the activities on board ship, by giving him a grasp of principles involved in any problem in the broad engineering field.

### Outline of Course at Postgraduate School, Annapolis

The course at the Postgraduate School is divided into four terms of twelve weeks each. Experience has demonstrated that encyclopedic information is not adequate, but on the contrary that the students must be led to a firm grasping of fundamental principles and to think for themselves. The first three terms (nine months) are devoted by all groups to a study of the fundamentals common to all engineering subjects. These are: mathematics, mechanics, physics, electricity, engineering measurements, engineering materials, thermodynamics, metals, chemistry and English exposition.

The fourth term consists of work along the line of the student officer's specialty and forms a connecting link between the fundamental postgraduate course and the specialist course given at the university.

The morning periods at the Postgraduate School are devoted to classroom work while the afternoons are spent in the laboratories. This laboratory work, which takes the form of practical demonstrations of the classroom work, serves to fix firmly the elemental laws in the student's mind. The student is therefore made more practical by this particular method than if he undertook practical work without a knowledge of the theory. It is this very feature of the course that places the student on a plane above the practical mechanic, however good the latter may be. The practical mechanic soon reaches his limit, whereas the man who has practical knowledge plus the understanding of fundamental principles is not thus limited and to him we must look for continued progress.

The laboratory facilities of the Postgraduate School are exceptionally good. They represent a large investment and are believed to be quite on a par for their purposes with any in the country. They consist of laboratories for general physics; electrical measurements; electrical tests, heat physics, optics, chemistry, metals and metallurgy, testing materials, internal combustion engine tests, radio and mechanical engineering measurements.

The Engineering Experiment Station offers facilities for experiments and tests to determine efficiencies and operating characteristics as well as to illustrate the principles of thermodynamics. Examples of the tests under service conditions at the Experiment Station are: steam turbine, condenser, steam air ejector, three effect evaporating plant, feed water heater, steam orifice, dynamic balancing machine, forced draft blower, coal and oil burning boilers and airplane engines.

The facilities of the departments of the Naval Academy are used by the student officers. The proximity to Washington makes it possible to visit the Gun Factory, the Bureau of Standards and other places of professional and scientific interest located there.

The professors of the Postgraduate School are specially selected; they understand the naval officer's point of view and they are very able in their methods of imparting their information. Emphasis is placed on the student officer's learning to think things out for himself. "Quizzes" are given from time to time. Examinations are held at the end of each term. Marks received are not entered on the student officers' fitness reports and officers are given to understand that they are not engaged in a competition for marks. This fact has a great deal to do with the freedom felt by the student officers in approaching their instructors to obtain explanation of difficult points. The whole atmosphere of the place is one of study and the officers leave the Postgraduate School enthusiastic about their work and equipped to uphold their end in the civilian institutions. The results are very satisfactory. Following is a condensed outline of the first three terms' work at the Postgraduate School.

### FIRST TERM WORK

*Mathematics*—Functions, graphs, solution of equations, analytic geometry and beginning calculus. Uses of slide rule, etc.

*Mechanics*—Fundamentals, force systems, graphic and algebraic representations.

*Physics*—General physics, particularly the fundamentals in mechanics, sound, heat, light and electricity which are most important in engineering subjects. Laboratory work—Fundamental measurements and tests to illustrate classroom work.

*Engineering Measurements*—Measurements of time, angular and linear speed, temperature, pressure, flow of liquids, power. Calibration and limits of accuracy. Laboratory work to illustrate.

*Hydraulics*—Study of fundamental principles and applications. Laboratory work to illustrate.

*Chemistry*—Principles, chemical reactions and atomic theory—gas laws and kinetic theory. Valency; equations; ionization; chemical equilibrium; electro-chemistry; thermo-chemistry; preparation and properties of non-metals and metals, etc. Laboratory work.

*Lectures* are given each Saturday during three terms on subjects of interest in the engineering field, and those of general interest calculated to stimulate the student's imagination and to broaden his outlook.

*English Exposition*—How to study. Logic. English exposition with lectures and practical problems. One hour a week for one or two terms.

SECOND TERM WORK

*Mathematics II*—Conic sections. Further work in calculus, and analytic geometry.

*Mathematical Laboratory*—Construction of scales, curves, alignment charts. Exercises in uses of mathematical instruments such as integrators, planimeters, etc.

*Mechanics II*—Moments, moments of inertia. Kinematics, kinetics, applications such as balancing, governors, gyroscope, etc.

*Physics II*—A laboratory course in the physics of heat designed as a complement to the course in thermodynamics. Heat values, specific heat, mechanical equivalent, coefficient of expansion and temperature of a gas, coefficient of linear expansion. Vapor—pressure—temperature, relation for water, E. M. F. versus temperature for a thermo couple, etc.

*Electricity II*—Electric and magnetic circuits. Laboratory experiments go into subject extensively.

*Thermodynamics II*—Introduction to the specialized study of any of the branches of naval engineering which include in their scope the phenomena of energy transformation involving heat, as in main drive machinery, steam auxiliary machinery, internal combustion engines, refrigerating systems, the torpedo or interior ballistics. First law, second law, general equations. Supplemented by laboratory work.

*Engineering Materials*—Course in strength or mechanics of materials. Problems of practical engineering situations are given to illustrate the text. Study of specifications. Stress, strain, shear, beams, deflection, columns, struts, torsional stresses in shafts, horsepower of shafts, springs,

thin spheres and cylinders, riveted joints, plates, hooks, links, etc. Laboratory work acquaints the student with methods of testing, physical properties of materials, and illustrates the theory.

THIRD TERM WORK

*Mathematics III*—Differential equations. Complex quantities, probability, graphical and mechanical computations.

*Mechanics III*—Work and energy, force systems, efficiency, impulse and momentum, impact. The gyroscope.

*Electricity III*—Structure of dynamo. Armature winding, magnetization curves and leakage, armature reactions, characteristics, motors, commutation, efficiency, rating, heating, etc. Laboratory work. Experiments to illustrate, and operation of many types of electrical machines.

*Optics III*—Primarily for ordnance class. Geometrical optics of telescopic instruments and physical optics applicable to naval use. Extensive laboratory work to illustrate.

*Thermodynamics III*—Continuation of Thermodynamics II. Applications in practical working cycles and processes. Steam engine, turbines, air compressor, refrigeration, combustion, internal combustion engines, processes with gas and vapor mixtures. Laboratory course illustrates. The laboratories of the Postgraduate School, Engineering Experiment Station and Department of Marine Engineering and Naval Construction, U. S. Naval Academy, are all used.

*Metals*—Includes metallurgy and manufacture of commoner metals and alloys, followed by general metallography and the metallography and heat treatment of iron and steel in detail. Laboratory work to illustrate.

*Chemistry III*—Laboratory work in qualitative analysis. Quantitative analysis, common standard tests of engineering materials.

FOURTH TERM WORK

(Special work for each group)

**Mechanical and Electrical Engineers**

*Mechanics ME4*—Analysis of reciprocating parts. Balancing inertia forces in multicylinder engines. Computations for a service engine. Vibrations and critical speeds. Review of fundamentals, kinetics and mathematical processes to insure thorough understanding.

*Electricity ME4*—Alternating currents, theory. Application in laboratory.

*Thermodynamics and Marine Machinery ME4*—Special application to naval prime movers and auxiliaries.

*Machine Elements ME4*—Introduction to specialized study in any branch of mechanical design work. Supplemented by computation periods.

*Metals ME4*—Special preparation for advanced work in metallurgy and metallography. Alloy diagrams, photo micrographs, microscopic examina-

tion and analysis of relationship between microstructure and alloy diagram to which it belongs. Illustrated lectures, and laboratory.

### Communication Engineers (Radio)

*Mathematics R4*—Vector analysis, differential equations.

*Electricity R4*—Same as Electricity ME4.

*Radio R4*—Principles of electric oscillations, waves, and their applications to modern radio apparatus. Radiation, radio compass, vacuum tube and uses. Laboratory work to illustrate. Sending and receiving are practiced daily.

### Aeronautical Engineers

*Mathematics A4*—Same as Mathematics E4.

*Mechanics A4*—First half term same as ME4. Second half term—dynamics of a rigid body. Moments and products of inertia for solids, ellipsoids, etc. Motion about fixed axis, in two, and then three dimensions.

*Aeroplane Engines A4*—Preparation for advanced work in power plant unit of aeroplanes. Engine as a heat motor, as a mechanism. Miscellaneous theory. Laboratory work and practical work. Analysis and test of various engines, blower, heat transfer, ignition. Diagrams and layouts and problems in machine elements specially applicable.

*Engineering Materials A4*—Stress analysis and framed structures, strength of materials specially applicable to aviation. Laboratory work to illustrate.

*Chemistry A4*—Special course for aeronautical engineers on the chemistry of fuels and lubricants. Laboratory work to illustrate.

### Ordnance Engineers

*Metals* (Torpedo and Ordnance Design Group)—Fundamental principles of general metallography. Heat treating steel.

*Machine Elements* (Fire Control—Torpedo and Ordnance Design Group)—Principles of kinematics and mechanics applicable to the construction of ordnance.

*Marine Machinery* (Torpedo Group)—Principles of thermodynamics and application to torpedo power plant.

*Electrical Engineering* (Fire Control Group)—Alternating currents covering inductance and capacity, and A.C. circuits. Finish D.C. machinery and begin A.C. circuits in laboratory.

(Other groups) Alternating currents covering inductance and capacity, and A.C. circuits as above. Elementary D.C. design.

*Engineering Materials* (Fire Control, Torpedo and Ordnance Design Groups)—Review of principles involved in mechanics of materials.

*Chemistry* (Explosives group)—Principles of organic chemistry and physical chemistry relating to explosives.

*Ordnance* (All groups)—Rules for gunnery exercises, Naval Academy ordnance textbook for general information, fire control installations, torpedoes, mines, spotting and plotting room procedure. Practical work

on these subjects in Department of Ordnance and Gunnery, U. S. Naval Academy.

*Mechanics* (All groups)—Elastic strength of guns and an introduction to the new ballistics.

*Optics* (Cont'd) (Fire Control, Explosives and Ordnance Design Groups)—Geometrical optics of telescopic instruments used in Navy. Theoretical and practical quantitative laboratory study of the properties of lenses, prisms, and assembled optical systems.

On leaving the Postgraduate School, Annapolis, the student officers are sent to civilian universities for more specialized work. The university work covers a period of eight months.

The following courses are pursued in civilian universities: ordnance engineering (fire control, explosives, ballistics, ordnance design, torpedo design, ordnance metallurgy); engineering design (mechanical, electrical, electric ship propulsion, internal combustion engines); aviation engineering; communication engineering (radio); naval construction; and civil engineering.

### Marine Engineering at Columbia University
(Period—one year)

*Mechanical—Summer term:* Alternating currents, storage batteries. *Winter Term:* Heat transfer, machine design, engineering thermodynamics, machine analysis, experimental procedure, metallurgy and metallography, electrical laboratory. *Spring term:* Organization and management, electrical laboratory, experimental procedure, shop processes and machine tool analysis, steam turbines and power plant equipment, optional (one or the other must be selected), steam machinery analysis, drawings, computing and reports, or internal combustion engines, drawings, computing and reports.

*Electrical—Summer Term:* A.C., storage batteries. *Winter Term:* Telephony, D.C. design, technical A.C., motors, electrical laboratory, heat transfer, metallurgy and metallography. *Spring Term:* Electrical plants, motors, electrical laboratory, radio laboratory, steam turbine and power plant equipment, optional (one of the group must be selected) design or auxiliary apparatus, seminar, electricity on ships, or design of electric propulsion machinery, seminar, electric propulsion.

### Communication Engineering (Radio) at Harvard University
(Period—one year)

Special problems in communication engineering, hydrophone engineering, telegraphy and telephony, electric oscillations, applications, electric waves and radio frequency measurements, electron tubes.

### Aeronautical Engineering at Massachusetts Institute of Technology

(Period—one year)

Advanced calculus, theoretical aeronautics, airplane design, airship design, aeronautical laboratory, theory of structures, aeronautical engines, machine design, propeller design.

### Ordnance at Carnegie Institute of Technology

(Period—one year)

*Metallurgy:* Physical chemistry, metallurgical calculations and laboratory, special metals and laboratory, electro-metallurgy, quantitative analysis, industrial management.

### Ordnance Design at Massachusetts Institute of Technology

Mechanics of machines, dynamics of machines, materials of engineering, physical metallurgy, heat engineering, engineering laboratory, special machine design, special turbines, metallography and heat treatment, A.C. and A.C. machinery and design, mathematical laboratory, gyroscope and applications.

### Ballistics Group at University of Chicago

Special advanced mathematical course.

### Fire Control at Columbia University

Electrical motors, D.C. and A.C. design, A.C. engineering, telephony, A.C. laboratory, standardizing laboratory, theoretical optics and radio.

### Explosives at University of Michigan

Advanced course in chemistry and explosives.

### Naval Constructors
### Massachusetts Institute of Technology

(Period—two years)

*First Year:*

A.C. and A.C. machinery, A.C. applied, electrical engineering laboratory, internal combustion engines, marine engine design, marine steam turbines, business law, model making, naval architecture, political economy, shipyard practice, theory of warship design, warship design.

*Second Year:*

Aeronautics theory and design, merchant shipbuilding, naval architecture, business management, structures (lecture and drawing), mathematics, rigid dynamics, theory of warship design, warship design, thesis.

### Civil Engineers

Two-year course at Renssellaer Polytechnic Institute in essential civil engineering subjects.

### Practical Work

The summers are devoted to practical work in specially laid out courses in engineering plants or in navy yards. The engineering groups for instance go to Babcock and Wilcox Boiler Company, New York Navy Yard, the General Electric Company, Westinghouse Company, Vibration Specialty Company, New London Ship and Engine Company, Submarine Base, New London, Western Electric Company, Bureau of Standards, etc.

The naval constructors receive instruction at navy yards.

The ordnance groups have a ten months' course of practical work at such places as the Naval Gun Factory, the Naval Proving Ground, Bureau of Ordnance, Army Proving Ground and at private plants.

### Results

It is hard for many officers to have to go to school again, but this has been found to be the one best way to prepare them, and there is no alternative to a solid fundamental grounding.

Officers upon reporting at the Postgraduate School are found weak in mathematical equipment as well as in physics, thermodynamics and other fundamentals. The first three or four months are proof positive to the officers themselves as well as to the faculty, of their condition of lack of preparation. This is natural as they have been out of touch and have lost the "study habit."

As the student officer progresses in the course he realizes that he is fitting himself to face future problems in any line of work. He becomes schooled to think things out along logical lines and to avoid snap judgments. His outlook is broadened, his mental stamina is increased, he appreciates his own limitations. When the student officer completes his first year at the Postgraduate

School he is then ready to pursue an advanced technical course or to continue general duties of the line with better results.

Valuable as is the technical training received, the greatest benefit of all lies in the increase in mental efficiency. The general standard of the line of the Navy would be very appreciably raised and it is believed the amalgamation problem would be largely solved if all junior officers were required to take the standard course at the Postgraduate School, preliminary to taking the junior war college course.

# MILITARY GENIUS AND THE NAVAL WAR COLLEGE

By Major J. M. Scammell, Infantry O. R. C.

GREAT captains are made, not born.

It may be laid down as a general rule that the greatest military leaders of modern times have been the product of the systematic and intensive study of their profession. Of antiquity we cannot say the same for two reasons. The first reason is that we lack the records of the early preparation for command of the great captains of ancient times. The second reason is as follows: war being merely an extraordinary means of carrying a national or dynastic policy into effect, it is no more than an aspect of statecraft. In antiquity, diplomacy, one of our modern resources for the carrying out of policies without recourse to violence, was crude and ineffective. Therefore, war was almost the sole means available to a statesman when a policy of one state was opposed by another. War and statecraft were therefore intimately related and the heads of states were commonly instructed in the arts of war and themselves led armies in battle. Even in republics, such as Athens and Rome, those who held the civil power conducted wars likewise. Examples are Themistocles, Pericles, Pompey and Caesar. Moreover, this was more practicable in those days because war was not the complicated and technical business that it is today.

But from the time that gunpowder introduced not only a new technique but also an element of mystery into war—the gunners jealously guarded their trade secrets at first—the breach between soldier and civilian, especially between general and civilian, became wider. This was emphasized by the growth of professional armies.

When this process began, soldiers commenced to study carefully the art of war. Although there was fighting continuously, and men desirous of learning the technique of war went from one army to another to get experience, it would be a great

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mistake to assume recklessly that the great soldiers placed a premium on so-called "practical experience." Those cadets who expected to embrace a career of arms studied intensively the works of the masters of war, especially those of antiquity: Vegetius, Aelian, Frontinus, Xenophon, Caesar, Tacitus, Plutarch and Polybius were religiously read and digested.

Maurice of Nassau, Saxe, Turenne, Montecuccoli, Marlborough, Gustavus Adolphus and Frederick the Great were thoroughly familiar with these classics; in many cases they themselves were great scholars and commented upon these masters and upon the campaigns of their predecessors. They would have ridiculed the pretentions of any officer who prided himself upon being solely a "practical" officer. Marshal Saxe not only read the classics and made a profound study of military systems, but he wrote treatises, among them his famous "Reveries" in which he quotes the ancient Roman practices. Prince Eugene regarded with complete contempt a military officer who was inferior in erudition to civilians of his class or rank. Montecuccoli modelled himself upon the Roman general Fabius. He knew the Punic Wars well. Not only that, but so great an admirer was he of literature and science that he helped to establish an academy for the study of history and poetry. Marlborough knew his Vegetius. Gustavus Adolphus "was fond of reading, well-versed in ancient literature, and intimately acquainted with the classical treatises on the art of war, from which he derived his tactical ideas." He was a master of military literature. It does not need to be true to be significant that it is told of him that he always slept with a copy of Grotius' *De Jure et Belli et Pacis* under his pillow.

Nor did he have any use for so-called "practical" officers. For the education of those to whom he confided the leadership of his soldiers he had the best military treatises translated. They were instructed by the pupils of Maurice of Nassau and had to pass tests that would appall modern officers.

The army of Gustavus Adolphus was the military school of Europe. That king was the Xenophon of his day. Moreover, as Xenophon learned his theory of war at the feet of the great Athenian philosopher Socrates, so Gustavus did not scorn the learning of the English philosopher Bacon. In short, in the words of one writer, "It never entered the head of any soldier of

the armies of Elizabeth, Henry of Navarre, or Maurice of Nassau, or Charles I, or Cromwell, or Wallenstein—that Ignorance was not Night's daughter, and that any officer could regard lack of a general education as anything but a disaster to himself."

Perhaps the most striking example of the high regard in which military scholarship was held in those days is offered by the career of Ambrosio de Spinola. This famous soldier was born in Genoa in 1569 and began as a merchant in the Levantine trade. Early in life he accumulated a great fortune. His leisure and his wealth he expended in a study of military affairs. Spinola spent no less than six hours a day on these studies. He read Vegetius, Pliny, Caesar, Xenophon, Polybius and Plutarch. While still a merchant he came to be regarded as an authority on military matters. The King of Spain, then the head of the finest army in Europe, did not hesitate to commission him in his service. Spinola raised, organized, equipped, administered and led his own army. When it arrived in the Netherlands he was able to give the war-worn Spanish forces a pattern of discipline and steadiness, and when the Spanish Army broke, Spinola retrieved the situation. His first opponent was the redoubtable Maurice of Nassau, the first soldier of Europe, who had spent his life in the field. Spinola finally worsted this master and saved the Spanish cause from disaster. "He recognized, as did Sir Charles Napier two centuries later, before undertaking the conquest of Sinde," said a recent writer, "that by reading alone can a soldier become a master of his art, or hope for true fame."

Even the barbarian conqueror Tamerlane did not fail to recognize the value of study. To him a general and a ruler were the same, and so he made no distinction, but he stated:

"History and politics should be studied by a ruler, that he may know what has happened to kingdoms and realms, and wherefore and how it happened." He said also:

"One experienced and able soldier can direct the efforts of thousands of thousands." Even that blood-thirsty Tartar would have considered our recent attitude toward military education as that of ignorant savages. When Tamerlane went to war he called a council of plan-makers. These did not scorn the uses of learning. When about to invade India such a council was held and in it the Prince of Shaarohd quoted precedents from the Turki annals.

Of Admirals up to this time we have said nothing. This is because, up to the period which has been discussed, they were interchangeable with generals. Even Cromwell used Blake to command at sea. But those almost purely sea-fighters, Drake and Raleigh, were by no means ignoramuses; in fact Raleigh was a very learned man.

I do not know in how far the general public still considers Napoleon a heaven-born military genius, but among military men that legend has long been exploded. With them it is a commonplace that Napoleon himself denied this absolutely. He attributed his success to years of study and to habits of profound reflection. The quotations to prove this are so hackneyed among soldiers and sailors that I hesitate to employ them. But there is one striking conversation recorded in which Napoleon was discussing his campaigns with some of his marshals and one of them remarked to the Emperor that in all his wars he had learned nothing because his first campaign was by far the most brilliant. Napoleon frankly agreed, saying that in time of war one had no leisure in which to learn, but that one could learn war only in time of peace. The most brilliant of his campaigns was due to long and intensive study. Napoleon sent to the Directory for the records of Marshal Maillebois' Italian campaigns of 1745 and it was upon a study of these that he based his own Italian wars. Napoleon at St. Helena said that only by a study of the great masters of war could a soldier hope to learn his profession.

It is also a commonplace among military men that the Prussian Army which had not fought since 1815, as a result of peace-time study of war, beat the Austrians in 1866 and the French in 1871, both of which had had recent practical field experience.

Not so generally known is the fact that the Archduke Charles, Suvarov and Wellington, Napoleon's greatest rivals and opponents, were also great students; or that Jackson and Lee devoted years to military studies. Von Moltke was, of course, a profound student of war; and the greatest military genius since Napoleon, Skobeleff, was an omnivorous reader. Nelson also was a profound student.

But for some curious reason our own military men, like the British and French after the Napoleonic Wars, came to regard study as a positive detriment to successful conduct of war and to

hold up the ridiculous ideal of the "practical" officer. The Spanish-American War, so inaptly handled that military historians often dismiss it with contempt as useless for study because everything was so clumsily done, shows the results of so perverted an ideal. The Boer War was much the same until the British sent for the great scholar Colonel Henderson to get them out of the mess they had got themselves into.

Hence the obstinacy with which our naval service has in the past ridiculed the idea of learning the arts of high command at a War College was a distressingly and shockingly perverted attitude such as even barbarians scorned in the past. There is not and there cannot be the slightest warrant for it. Fortunately, that era is now past.

Over 2,000 years ago the old Attic philosopher Socrates commented: "Kings and commanders," he said, "were not those who held scepters merely, or those elected by the multitude, or those who gained authority by chance, or those who attained it by deceit, but those who knew how to command."

Plato in *The Republic* records this Socratic dialogue:

"'What then,' said I, 'as to the contest of war; does it not appear to require art?'

"'Very much,' said he.

"'Ought we then to take more care of shoemaking than of the art of making war?'"

Socrates repeatedly urged those who aspired to lead in war to study carefully their craft. His arguments immediately appealed to Pericles, who once had the following conversation with the philosopher:

"'Yet in military affairs,' observed Pericles, 'in which it is most requisite to act with prudence, and order and obedience, they pay no regard to such duties.'

"'It may be so,' returned Socrates, 'for in military affairs, men who are greatly deficient in knowledge have the command of them—the most of our generals undertake to command without previous study.'"

The historian Thucydides makes it clear that so proficient did Pericles become that he had a grasp of the value of sea power unrivaled until our own day, and that had the Athenians followed

his strategy after his death, the great Peloponnesian War would have had a different outcome.

If Socrates was so plain-spoken in all matters—and he was—it is clear why the politicians made him drink the poison hemlock.

But he did not mind; for he believed that the Truth will live; and he knew it to be true that, "As the whole state, in the perils of war, is entrusted to the care of the general, it is likely that great advantages will occur if he act well, and great evils if he fall into error."

For this reason, a weighty enough one, and for no other, the United States Government had the vision to set up at Newport a Naval War College where naval officers could repair to study the art of war in time of peace.

The report of the board presided over by Commodore Stephen B. Luce, and of which Commander W. T. Sampson and Lieutenant-Commander C. F. Goodrich were the other members, led to the establishment of the U. S. Naval War College, where later Admiral A. T. Mahan wrote his epoch-making words on sea power. In its report this board stated:

"The bare statement that our naval officers not only do not study war as a science, but have no adequate school of practice, seems in these days of broad and liberal culture so extraordinary that it is alone, in the judgment of the Board, sufficient reason for the early founding of the institution which the Department now has under consideration."

Until recently it has not been appreciated by the Service. In its early years it was difficult to force officers to attend.

But, "Those who came to scoff remained to pray," and the Secretary of the Navy who started for Newport to close its doors forever, on the way was urged to read Mahan's *Influence of Sea Power on History* and, stating that this one book alone was worth the money, became an ardent supporter of the institution.

Now that graduates who have felt the benefits of such a course of study are so numerous that their influence is widely felt there is a certain amount of competition for the privilege of attending. Moreover, beginning with this year, a Junior War College is opening its doors to spread the light of learning more widely and to give to younger officers some of the advantages now enjoyed only by those of higher rank.

This step has a double significance. Not only will it begin the process of learning earlier and so give more years of instructed service to the Navy, but it will take the pressure off the Senior college. Perhaps, even, it will prepare the way for the realization of the significant ideal set forth by Mr. Adams in his article "Economic Competition" in the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, Vol. 29, in which the author states:

> You need scientific men in the Navy, as well as practical seamen, but you also need economists and historians, for without these you will be weak in a vital point. You will lack a channel of communication with the public, and such a channel is essential both to you and to the nation.

The tide of sentimentality, of superficial buncombe, is ebbing. The radical with his quack remedies, the pacifist with his nostrums, is giving way before sober conservatism. Get-rich-quick schemes are being discredited. The salvation of hard work is again coming into its own. The military no longer expect to find sucking Nelsons or full-fledged Napoleons coming out of the Naval Academy or West Point. They have given over the search for the philosopher's stone and the secret of transmutation of metals and gone to work to study history and chemistry.

But there have always been and perhaps always will be those who seek for a facile explanation of the works of genius. Such a one, desiring to know the secret of the wonderful color effects gained by a great painter once inquired with what he mixed his paints. "With brains, sir!" was the sharp reply. That is the secret of the combination known as Victory: it is mixed with brains; and brains are cultivated only by study.

# RECENT DEVELOPMENTS IN THE NAVIGATION OF THE AIR

By H. B. Goodwin

A NEW departure of some little importance in connection with long distance navigation in the air has recently been taken by the publication on the part of the "Club Militar Naval" at Lisbon of an interesting memoir of the historic voyage from Lisbon to Rio by aeroplane, accomplished by two Portuguese naval officers in the spring of 1922.

The officers in question were Rear Admiral Gago Coutinho and Commander Sacadura Cabral, who in the *Journal* of the "Club Militar Naval" for the months October to December, 1922, gave a detailed account of the methods of navigation adopted, with practical examples as actually worked upon their adventurous voyage. This memoir has lately been reproduced in the form of a pamphlet, with translations in French, English, and German, so that practically the whole world of navigators is enabled to share in the benefits resulting from this epoch-making voyage. The opening chapter is naturally devoted to a discussion of the methods of keeping the reckoning independently of the heavenly bodies, in connection with which the effects of "drift," naturally much more formidable in amount than is the case in ocean navigation, are considered at some length. To gauge the effects of "drift" it is essential to have access to some point of reference which may be considered at rest, and such a point is generally available, when the flight is over land. But at sea, except in the case of a becalmed sailing vessel, the point of reference has to be created. Recourse is in general taken to a smoke bomb containing a deposit of phosphide of calcium, which is opened before being dropped into the sea, when the water decomposes the phosphide, and the phosphorous gas liberated takes fire spontaneously on reaching the air. A white smoke is thus produced, visible at some distance, and marking a

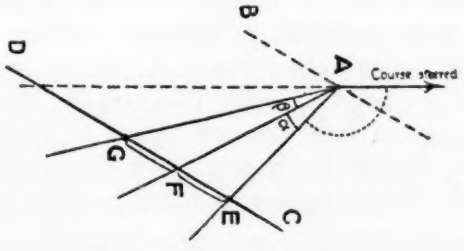
[Copyright: U. S. Naval Institute, Annapolis, Md.]

spot passed over by the aeroplane. The device, we are told, has not yet been fully developed by the expert, but another system is now being studied in which a substance is used of such a nature, that, being poured into the sea, it will leave a spot perfectly visible from the air.

In connection with the use of the bombs a small instrument called the *Course Corrector* was employed on the voyage. This instrument had been used by Admiral Coutinho and Commander Cabral on a previous voyage from Lisbon to Madeira in March, 1921, and had been exhibited by these officers at the International Congress of Aerial Navigation in November, 1921.

A more or less reliable method of finding the amount of "drift" is naturally a matter of the first importance in the navigation of the air, and attention may be directed here to an extract from a lecture by Squadron Leader H. E. Wimperis, O. B. E., before the Royal Aeronautical Society in April, 1919, and quoted in a work on aerial navigation by Lieutenant J. E. Dumbleton.* The extract is as follows:

> Perhaps the best method is to take times and bearings of the object as it passes through the points E, F, and G, such that the time from E to F is equal to the time from F to G. Then if the angles α and β are small: i. e., not more than fifteen degrees, it is easy to find C D the course made good, by marking off A E proportional to the angle B, and A G proportional to L, and then joining F G.




The lecturer appears to have limited the case to small angles, such that their sines might be represented without sensible error by their circular measure, but this limitation is not really essential, and in the latest edition of *Norie's Nautical Tables* a "Course Angle" Table is included, which, having given three

* *Principles and Practices of Aerial Navigation,* London, Crosby Lockwood and Son. Price, twelve shillings and sixpence net.

bearings separated by equal intervals of time, will supply the course made good over the ground at sight, without recourse to any geometrical construction whatever. Such a table should be specially useful in the navigation of the air.

### Astronomical Navigation

The general principle observed throughout the voyage was this, that as much as possible of the work connected with the necessary observations of the heavenly bodies should be effected in advance. For this purpose a number of *points of reference,* differing each from each by two degrees of latitude, and one degree of longitude, were selected beforehand for each section of the voyage.

For instance, as the Equator was approached, these points were fixed as follows:

| *Point* | *Lat:* | *Long:* |
|---|---|---|
| A | 14°N | 24°W |
| B | 12°N | 25°W |
| C | 10°N | 26°W |
| D | 8°N | 27°W |
| E | 6°N | 28°W |
| F | 4°N | 29°W |

With an aeroplane traveling uniformly at upwards of seventy miles per hour, it was of course possible to hit off the time at which each point would be passed with sufficient accuracy to enable the declination to be corrected for an approximate Greenwich Date at the point. Having then latitude, declination, and hour angle deduced from the time shown by chronometer, the data would be complete for finding zenith distance, as required in the Marcq St. Hilaire system of fixing position lines followed throughout.

It only remained to throw the fundamental formula connecting the three sides of a spherical triangle with an angle into such a form as to permit as much as possible of the necessary computation to be performed in advance. The expression made use of, which was apparently specially deduced in view of the voyage, is the following:

$$\text{Sine Alt} = S \left(\frac{C + 1}{\sec h}\right)$$

the + sign for latitude and declination of same name, the — sign for different name, where

S = Log sine lat + Log sine dec
C = Log cot lat + Log cot dec
$h$ = Hour Angle.

The values of S and C, it will be noticed, can be prepared in advance, and duly recorded for the point involved.

The following example, for March 30, 1922, will illustrate the process:

Lat 37°N
Dec 3° 31.3′ N
$h$ $4^h$ $59^m$ $11^s$ = 74° 48′
Coef C 1.33353
Coef S 8.5680

| | | | |
|---|---|---|---|
| | C 1.33353 | | |
| L sec $h$ | .58139 | | |
| (Diff) | .75214 | Nat No | 5.651 |
| | | | 1 |
| | | (Sum) | 6.651 |
| | | Log. | .8229 |
| | | C | 8.5680 |
| | | (Sum) L Sine alt | 9.3909 Alt 14° 14′. |

The expression employed by the aviators, which appears to have been deduced from the fundamental formula for the special purposes of navigation in the air, has this advantage, that in the final stage only three openings of the tables are required. The same result might, however, be secured by methods in ordinary use to be found in the textbooks of navigation. The "All Haversine" process, for instance, an example of which is worked on page 159 of the *American Practical Navigator* (ed. 1919), might be brought into requisition; which possesses this recommendation, that only one table of logarithms is necessary, instead of two, the table of log secants and of natural numbers, as in the pamphlet.

The formula in this case is:

$$\text{hav } z = \text{hav } (p-c) + \Big(\text{hav } (p+c) - \text{hav } (p-c)\Big)\text{hav } h$$

where $z$ is zenith distance, $p$ polar distance, and $c$ colatitude. The work by this formula would be as follows:

PREPARATORY STAGE

| | | | | |
|---|---|---|---|---|
| $p$ | 86° | 29′ | | |
| $c$ | 53 | | | |
| $p+c$ | 139 | 29 | Nat hav (p+c) | .8801 |
| $p-c$ | 33 | 29 | Nat hav (p—c) | .0830 |

(Diff) Nat hav e .7971 Log hav θ 9.9015.

FINAL STAGE

The hour angle at observation having been found by means of the chronometer as $4^h\ 59^m\ 11^s = 74°\ 48'$, the work to be completed in the air is as given below:

| | | | |
|---|---|---|---|
| Log hav θ | 9.9015 (from above) | | |
| Log hav $h$ | 9.5669 | | |
| (Sum) Log hav φ | 9.4684 | | |
| | | Nat hav φ | .2940 |
| | | Nat hav $(p-c)$ | .0830 (from above) |
| | | (Sum) Nat hav $z$ | .3770 |
| | | $z =$ | 75° 46′ |
| | | alt = | 14° 14′ |

The use of three fresh logarithms for the final stage appears to represent the irreducible minimum in a method of this kind. In the words of the pamphlet, in connection with an alternative form proposed for the formula employed: "For the final stage, however, to enter the tables three times would be required, as is the case with all the known processes."

This form of treatment by means of values for selected positions on the proposed voyage calculated beforehand probably offers all the simplification possible, so far as the work to be carried out in the air is concerned. The procedure adopted for azimuth, however, is not so easily intelligible. The expression employed includes both altitude and hour angle, and involves

therefore as many openings of the tables as the calculation of the altitude.

The formula in this case is:

$$\text{Cosec Az} = \text{Sec dec cosec } h \text{ cos alt.}$$

and the work carried to three places of logarithms is:

| | | |
|---|---|---|
| Log Sec | 3° 31′ | .001 |
| Log Cosec | 74° 48′ | .015 |
| L Cos | 14° 14′ | 9.986 |
| L Cosec Az. | | 10.002 |
| Az = | S 84° .30′ E. | |

If the azimuth has to be calculated at all, the method selected by hour angle and altitude, generally known as the "Sine Method," offers a reasonably simple method of finding its value, but it seems a little extraordinary that the Azimuth Tables which have now been in general use at sea for upwards of fifty years should not be turned to account in a case where the saving of labor in logarithmic computation is so important. In the present instance we have only to turn up in Burwood's Azimuth Tables, Lat. 37° Dec. 3° 30′ (same name) Hour Angle $5^h$, and we have at sight the value N 96° E or S 84° E approximately the value sought.

There is, moreover, a special objection to the use of this formula, in that it leads us into troubled waters in the neighborhood of the Prime Vertical, as indeed seems to be admitted in the following passage from the pamphlet:

> This formula is not reliable in cases where the declination of the star is less than our latitude, but the usual tables of the favorable circumstances for the computation of the hour angle, showing the time at which the star cuts the East-West line, may be employed to avoid confusion. We only had to deal with this case during the journey from Cape Verde to the St. Paul Rocks.

Just as the Altitude Azimuth fails near the meridian so the "Sine Method" cannot be relied upon near the Prime Vertical. It is only the Time Azimuth, the problem on which the Azimuth Tables in common use are based, which, except for very high altitudes, when it is almost impossible to determine exact azimuth at all, can be depended upon in all cases.

### An Alternative Method for Zenith Distance in the Tropics

Not satisfied with the simplification already effected in the general problem, the distinguished aviators, on entering tropical latitudes, hit upon a still shorter and simpler process for finding zenith distance, for use in those parts of the world where the sun at noon attains an altitude approaching ninety degrees. In this case nearly all the calculations necessary can be performed in advance, leaving nothing but a simple matter of subtraction of one angle from another to be carried out in the air. So far as the writer is aware the principle of the method is entirely new, nor is any reference to such a process to be found in the works of Bowditch, Norie, Raper, or in any other standard textbook. In the pamphlet the process is introduced as follows:

> In the neighborhood of the Equator, and when the sun has a low declination, as was our case in April, as is easily deduced from the general formula for the resolution of the already mentioned nautical triangle, the altitude of the sun, which nears ninety degrees at noon, does not differ much from the complement of the hour angle. And, as the variation of the addition of the hour angle and altitude is slow, at least in the later hours, it becomes easy to compute a table for that addition. Therefore, starting from the hour angle, an altitude is immediately obtained by means of an interpolation at sight, and an elementary subtraction. Such was our case when on April 18, we approached St. Paul Rocks. The table used on that occasion and also an example, will give a quick idea of the practical execution of this process.

The data of the example were as follows:

Lat. 1° N Dec. 10° 45′ N Hour Angle (from chronometer) $4^h\ 54^m\ 45^s$.
Observed Altitude (corrected) 16° 8′.

With the given values for latitude and declination the altitudes were computed for successive values of hour angle, giving results as shown below.

For $4^h\ 40^m$, or 70° in arc, the altitude was found to be 19° 49′, the sum of which quantities (70°+19° 49′) = 89° 49′. Similarly for the following values, the hour angle being increased in each case by $10^m$, or 2° 30′.

The following is a section of the resulting table:

| $h$ | Sum |
|---|---|
| $4^h\ 40^m$ | 89° 49′ |
| 50 | 52 |
| 5 0 | 54 |
| 10 | 57 |
| 20 | 90 0 |

The altitude required having been duly observed at $4^h\ 54^m\ 45^s$ the work is completed in the air as follows:

| | |
|---|---|
| From table sum for $4^h\ 55^m$ | 89° 53′ |
| Hour Angle in arc | 73 41 |
| (Diff) Altitude | 16 12 |
| Observed Altitude | 16 8 |
| Intercept. | 4 |

The saving of labor effected by this extremely ingenious notion will be easily appreciated if we compare the work given above with that which would be required if we proceeded in the manner which at first suggests itself, by tabulating altitude and hour angle earlier and later than the time when it is anticipated that the altitude will be observed, and obtaining the calculated altitude by proportion. In the present instance we should have results as follows:

| Hour Angle | Altitude |
|---|---|
| $4^h\ 40^m$ | 19° 49′ |
| 5 0 | 14° 54′ |
| 5 20 | 10° 0 |

It is required to obtain the altitude at $4^h\ 54^m\ 45^s$.

If $x$ is the amount to be subtracted from 19° 49′, the altitude at $4^h\ 40^m$, we have

$$x = \frac{14^m\ 45^s}{20^m} 295' = \frac{885}{1200} 295' = 217.5'$$

Thus the altitude required is 19° 49′—3° 37.5′ = 16° 11.5′.

A comparison of the two processes brings out clearly the advantages of tabulating the sum of hour angle and altitude rather

than the simple altitude itself. This happy idea of the Portuguese officers gives the calculated zenith distance immediately after the observed distance has been secured, and should be of great value not only to air navigators, but in ocean navigation also.

Some interesting details relating to the voyage are given in a statement drawn up by Admiral Coutinho. The number of nautical miles covered was 4,527, sixty-two hours twenty-six minutes being actually spent in the air, giving an average speed of seventy-two and one half miles per hour. The longest voyage was from Praia to St. Paul Rocks, 908 miles, accomplished in eleven hours, 21 minutes, and the shortest Las Palmas to Gando 15 miles, in twenty-one minutes. During thirty-six hours forty-four minutes spent out of sight of land the aviators computed ninety-six sets of sun observations, giving a mean of twenty-three minutes between the sets.

The work of the Portuguese naval officers is very happily summed up in the course of a foreword to the pamphlet contributed by the editor of the *Journal* of the "Club Militar Naval" in the following words:

> But what one most admires is the progress our distinguished comrades have accomplished, as regards the methods of astronomical navigation.
>
> The use of points of reference through the line of the intended crossing, and the able and skilful modifications of the formulæ of Nautical Astronomy, by which the observer may, before starting, prepare the greatest part of his calculations, in this way leaving only another quite material part to be done in the air, are the two original conceptions by which the astronomical navigation, with a sextant, can be done in the air with accuracy and comfort, as happens on board ship, together with the quickness exacted in virtue of the great speed of the aeroplane.

# IN LACQUER AND SILK

By Lieutenant Commander K. C. McIntosh (SC), U. S. N.

IF REPORTS are true, no one will ever again see Fujiyama as first I saw it. The day was cold and the early morning haze hid the rapidly rising shore. Dead ahead of the *China's* plunging stem a tiny smudge of darker gray loomed through the mist, the lazy smoke of O-oshima, the island volcano off Yokohama Harbor. An impatient small boy, less interested in the Japan that lay behind the haze than in the naval officer father which it somewhere concealed, I had been awake at dawn, and for nearly an hour had been staring through the portholes of the upper saloon when the haze lifted, and my breath left me in a long, audible gasp. The shore was not yet in sight, but up in the sky apparently without support hung the glittering blue-white cone of Fuji San. How long I stared I do not know. I have absolutely no recollection of moving from my bench, of breakfast, of the gradually rising coastline. In my memory there is nothing between that first wonder-sight of Fujiyama and the sudden glimpse of my father coming up the gangway ladder three steps at a time. To this day I do not know what the harbor entrance looks like from the outside, for the great white mountain has had all my attention at the beginning and the end of every visit.

All who have seen Yokohama will know the advantages from a small boy's point of view of the rooms engaged for us. They were in the Grand Hotel, of course. The Bluff and the Oriental were not yet in existence. They were on the ground floor, and in the exact corner of the Canal and the Bund, or harbor-front. All Yokohama, permanent or transient, went past my window at speaking distance. Every fishing boat that poled up the Canal was close enough for the fishermen to shout a shrill "O-hai-o, chisai!" to the tow-haired youngster on the window-ledge. Troops of dusty pilgrims nearly at the end of a long foot journey to the Motomachi Temple would stop under that window to stare at

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my white pompadour and remain to pass the time of day. The little policeman who patrolled that part of the Bund sometimes found leisure to play ball with me; for this was more than thirty years ago, and even American children had the key to the heart of Japan, the children's paradise.

There were many children in the hotel, but few of them appealed to me as playmates,—I had too many others, more interesting. Aside from the policeman, who taught me intricate new versions of "cat's cradle," there was the waiter who now and then laid up my napkin into a lifelike sprawling frog with red-currant eyes, or dropped "midzu-hana" into my finger bowl,—thin, dry sticks that grew as they touched the water into gorgeous branching flowers, fierce samurai with hand on swordhilt, or gaudily colored fishes.

Outside the main entrance of the hotel, on the Bund, one of some thirty jinrikisha-men who made up the stand, I could usually find my bosom friend Shima. He first attracted my attention because he alone of the entire rank was not dressed in blue. His jacket was the color of red clay and his running trunks were of burlap. I choose him for my runner for the first jinrikisha journey I ever took, and thereafter each considered the other his especial property. It was Shima who helped me scramble down the sloping seawall at low tide and who taught me the proper flick of the wrist which sent flat stones and clamshells skipping over the water. It was Shima who would whistle on slack days when traffic was light and his turn in rank a long time ahead; and I would drop anything in hand and run out to climb into his jinrikisha, and we would start on an exploring tour. He would trot to the curio shops and with our two noses against the glass of the window, we would exchange languages. "Hibachi!" he would cry with pointing finger. "Hibachi!" I would reply, "Fire-pot!" "Fi-eyah paw!" Shima would chuckle triumphantly.

It was Shima who perpetrated the chief waterfront witticism of the year. We were taking a long trip through the hills, and as my father is a large man, it was necessary for him to have two men, a "pully-man," and a "push-man." I weighed perhaps forty-five pounds at the time, but I could not be outdone in style, so to Shima, who pulled, there was added Joe (spelled "Jeyo" on

his hat) who pushed. Toward the end of the afternoon, we reached a short but very steep hill, and father's men broke unconsciously into the chant of the heavily loaded cartmen, "Hoi! Hoi!" alternately, keeping time to the thrust of their feet. They chanted under their breath, but loud enough for Shima, who was pulling with one hand, to hear. With a wide grin, Shima swung into the full-throated chorus, "Howda! Huda!" he intoned. Jeyo, who was pushing with one finger, chimed in. "Howda! Howdida, Huda!" My father's men blushed crimson, but the rest of the journey was uproarious with the chantey of Shima and Jeyo. For days and weeks afterward, they would begin the refrain whenever I perched my small self in Shima's cart, and they never failed to receive enthusiastic applause from the passers-by.

All the busy Motomachi was mine to play with. At every chance, I would scamper across the Canal bridge and into that narrow thoroughfare of wonders, there to spend an hour or so deciding what to do with the two or three copper coins in the pocket of my "regulation" overshirt. Sometimes it was a sword with silver-papered wooden blade that really pulled out of its red scabbard. Rarely (for my mother did not approve of the flies and sweet dust clustered on it) it was "midzu-ami," the pale, brownish sugar candy peculiar to Japan; but oftenest of all, it was what my sister and I called "surprises." These were tightly sealed clam shells of sweetened flour paste, one side pink and the other side white. After the first nibble, nothing could have induced us to eat the things; but once broken, something was always found inside, a tiny teapot, a doll, or a package of water flowers. One never knew what was inside until the shell was broken; and by some unwritten law, it became unsportsmanlike to break them until after reaching home.

At the head of the Motomachi stood (and I hope still stands), the Motomachi Temple, drowsing at the top of its long flight of steps. This temple has always been famous for silk paintings; but I remember little beyond its two points of attraction for me, the "traveler's god" and my friend the priest. One led to the other. The god, swathed in brilliant red and blue rags, stood outside, and each pilgrim as he passed would throw a pebble. If the pebble glanced off the image, the journey would be hard. If it caught in the ragged draperies and did not fall, the thrower

was protected against becoming footsore. I contemplated no journeys afoot,—was there not Shima ready and waiting?—but I could never pass those steps without throwing my pebble. One day as I skilfully tossed a stone into the god's sleeve, a new voice spoke, "O-hai-o, chisai!" (Good-morning, little fellow!) The thin gray priest I had sometimes noticed before was standing behind me with the smile that Japan reserves for children. I promptly answered "O-hai-o, gozarimasu!" and together we sat on the steps and began our first heart-to-heart talk. His name I never learned, but he was born to be a grandfather. He knew more fairy stories than even Gin San of the Hundred Steps. That jolly lady has been "written up" too often for me to depict her again; so I will only say that we children also knew O Gin San, no older, no younger and as chucklingly jovial as she was the day you yourself tugged up the Hundred Steps to taste her tea and sake. But unless you went there as a child, you probably never discovered what a treasure-house of fairy tales she was.

Crisp, smoky November days bring back memories of the far-stretched rice-paddies of Negishi and fish-nets spread to dry. There, tucked behind the shoulder of a hill was the little shrine with the carved bronze bell hung from a torii outside. Privileged as children are in Japan, it was I that swung the log clapper against its side and filled the valley with its throaty song. Bells in Japan neither clang nor boom—there is no consonant at the beginning of their music. The largest and deepest-toned of them croon like the humming of a tuneful giant, the little ones sing like rubbed glass.

There is a picture in my mind of Sugita, a riot of plum blossoms, and of a little gray man who rushed out, chattering volubly, and plucked me bodily from my 'riksha. Before my startled mother could even protest, he had me held high over his head to look into the hollow of a dead tree where some velvety yellow shoots like pussy-willows were growing, and his wrinkled face broke up into a mass of smiles as I shouted my delight.

Kamakura! Not a detail of that solemn avenue of mighty trees has been forgotten. Twenty-five years later I saw Kamakura again. Little shops crowded the road, which was marked at every turn by the signs of the Automobile Club of Japan. Huge billboards advertising beer and soap and safety matches flanked

the approaches to the village. Stiff and unsmiling police restrained visitors from climbing into the lap of the great dreaming Buddha as I had done in my childhood. None of these things could break the spell of Kamakura. The hush was there, and the dappled sunlight, the ancient flagging marking the site of the pillars of the temple long ago overthrown by a tidal wave. Hachiman's temple brooded in the same silence of the centuries. Of Kamakura as a man I remember little; but of Kamakura as a boy I have forgotten nothing, even to the eerie sensation that I must have been there before, that it was all queerly familiar. I can see the leer of the god at the gate as the wet paper-wad of my chewed-up good luck wish splashed on his eyeball. I can hear my very laugh as the little brown guide vividly enacted the murder of the Shogun Iyeyasu beneath the great icho-tree, first hiding as the assassin, then stepping proudly down the flagged walk as the Shogun, dodging around the tree to stab himself and dying with the correct facial scowl of the Japanese tragic actor. So strong was the grip of my first visit, that on my last, when a chattering shopkeeper begged me to buy some trinket "because I know your wife like very much," I found myself answering in the forgotten formula of childhood, "Not now, I will come again the day before yesterday!"

The newspapers say that Enoshima is gone. Of course, in my recollection, Kwannon's cave has its place. The jewel-like gray-green of the "picture island" is unforgettable. But the vivid picture is of the crowding, chattering divers who plunged far down into the crystal-clear water, down, down till their yellow bodies showed iridescent blue, returning with the silver coin my father had thrown in their mouths, and in their hands brilliant shells for me. I remember now that the shells were suspiciously polished and dry, and must have been carried down in the divers' belt-pouches; but all I remember thinking then was a wistful wish that I, too, could swim down to those shimmering levels and pluck scarlet abalones and purple limpets from the waving seaweed on the rocks.

I knew the history of the Taiko Hideyoshi by heart. Every phase of the life of the great general was familiar and well-beloved. He was the Robin Hood of my childhood, bulking more heroically in my mind than even the Forty-seven Ronin of revered

memory. I rejoiced in his insolence to Sakuma and Shibata, I gloried in the triumph which brought him his first suit of Owari armor, and chuckled with glee at his victory in the controversy over the length of spears. For that reason, Osaka holds much of the unchangeable quality of Kamakura. Factory chimneys now belch forth their soot and smoke, and the hum of spindles makes conversation in the crowded streets difficult; but Hideyoshi's castle cannot be hidden. It looms impressively in the midst of the Twentieth Century, the stuff of which romances are fashioned, a dream in gray stone, visible, tangible evidence that my hero-general was not a myth like the silly, pompous Greeks in whom my teachers tried to interest me. Diomed and Hector shouted at each other for hours without a blow; but Sakuma and Shibata barely had time to learn that Hideyoshi had declared for the boy Emperor before they found themselves surrounded. Unlike all other heroes of medieval legend, Hideyoshi stands the acid test of advancing years. The one blot on his record in my boyhood was the disaster of his Korean expedition. Now I can plainly see the consummate statesmanship which preserved the independence of Japan by saving the predominance of Shinto as the national religion.

Close behind the Taiko in my gallery of heroes stands Yoshitsune, the relentless boy soldier, killed at last, so the story goes, by the ghosts of the slaughtered Tairas who had fallen before the shock of his charge. Today I like to think that Mr. Chamberlain is right, that the yellow-eyed boy did not die, but was banished by jealous seniors of his own clan, to reappear twenty years later in Central Asia as—Jenghiz Khan!

Nara, the ancient capitol, fell asleep when Yoshitsune disappeared. Hundreds of the stone lanterns in the long avenue are comparatively new, scores have lived for centuries. Here and there stands one, black with weather and crumbling with age, in whose shade the hero himself may have rested. Yoshitsune's nervous brown hands pulled the ears of the far-away ancestors of the sacred herd of dappled deer that today jump into your 'riksha and nose in your pockets for sugar cakes. His armor hangs in the oldest temple; and the plump white horse that crunches the handful of boiled beans you hold out to him is said to be the very descendant of his battle-charger. In the temple

over the hill the Nō girls dance to his memory while the calm-eyed priest, a figure of old ivory in stiff silk, clangs wooden cymbals and sings of his exploits. Nara at least escaped the horror of the earthquake. We have not been robbed of Nara with its great black Buddha and its huge, roaring, bronze bell.

If our western newspapers could know the first question in the minds of all who loved Old Japan, they would have broadcasted in heavy headlines "Kyoto is Safe" There is no best time of the year in Kyoto. Come when you may, the glorious old city holds something better than your dreams. Now it is cherry trees, carpeting the streets with their falling petals; again it is fragrant, rosy azalea, or royal wistaria, or scarlet maples blazing through the blue November haze between the hills. Cold and sparkling, mountain streams rush through the center of the streets, deep and swift between walls of gray stone. Incredibly poised on the cliff above the healing waterfall hangs Kyomidzudera with its low, hovering roof thatch and worn stone platform for meditation. San-ju-san Gendo's crowded, smoky-bronze interior carries you back to the Middle Ages.

The old artist who keeps the museum in the valley is scrupulously polite; but if your appreciation of the modern stuff on his tables is too loud, you will see nothing else. He watches you closely with a wistful look. Will you be another of the many who are pleased with the work of today? You show your appreciation mildly and glance around for more when you have seen all that the tables hold. You have pleased him by commenting on the two or three really old bronzes he has on display; so he timidly reaches for a locked box and with hope in his eyes slowly unrolls a very old piece of crackling silk before your eyes. Your indrawn breath catches in your throat, and the old man's face flushes with pleasure to find you worthy to view his treasure. It is only a few bold brush-strokes, two shivering monkeys in the snow; but in all the world there is probably no picture more poignantly alive.

Down in the city, as long as the daylight lasts, craftsmen and craftswomen spin brilliant webs of copper and enamel, for Kyoto is the center of the cloisonné industry. Others are damascening gold on gray iron. Yonder in the big compound, boys from all over the Empire tug and push at each other learning to be

wrestlers and swordsmen. Night falls, and as the yellow lamplight shines through the paper shoji of the close-nestled houses, the clinking of samisen and thrumming of Ko-tos accompany the trilling songs of the geisha, Japan's glittering little human butterflies. They stand in a close circle as you enter and sing rollicking and impudent songs of welcome. No hostess of the great world, however, is more gracious than the girl who gives you your cushion by the charcoal brazier, pours out your tea or hot sake and peels and slices apples for you. The girl in the corner sweeps her ivory pick across the tinkling strings of her biwa and breaks into a song about the lady who wanted to be beautiful. The plumpest of the dancers, in gorgeous scarlet, rises,—holds a pug-nosed, inane mask in front of her saucy face and begins to dance in slow graceful movements. She holds a mirror in her hand and shudders at her own homeliness. Then as she dances, she primps. Cosmetics are rubbed on the staring white mask. She piles her hair, then pulls it down again and rolls it. She touches her lips with gold and her eyebrows with black. She is making herself beautiful. At last, she can do no more, and again she raises her mirror. The silly mask, unchanged, stares back into her horrified eyes. It is no use,—she is still ugly. The mirror is dashed to the floor and the girl sinks on the cushions, hiding her face and sobbing. The music stops with a sweeping, jangled chord, the ugly mask is tossed across the room, and the dancer bounces up, again her jolly self. Perhaps your mother is wearing a veil. "What is that?" the dancer demands. "That means you Number Two Wife?" "No-o!" scornfully replies the biwa-player, "that is for mos-keet!"

Up the steep cobbled street your 'riksha clatters, and before you go to bed, you stand on your gallery at the Miyako and watch the twinkling lights of the city below; and as you fall asleep, the great bell of Chon-in sobs and thunders a deep-voiced lullaby.

Spring was coming and the apple blossoms on the Bluff were showing white when I first left Japan. Our departure was delayed perilously long, for Shima was gone from the cab rank, and I wanted to wait for him to carry me to the hatoba where the steam launch from the flagship was waiting. At last we could wait no longer, and with tears in my eyes, I climbed into Jeyo's jinriksha. As we whirled away, Shima appeared; but I could only shout over my shoulder, "Sayonara! Matakimasho!"

In later years, that is again my farewell to Japan, "Goodbye! I will surely come back!" Too much of my Japan is gone,—destroyed by progress as ruthlessly as by fire and earthquake and typhoon. It is lost to the coming generations; but to those of us who were children there, Old Japan cannot be destroyed. When we come back, as we always long to do, Old Japan is there as before, hardly blurred by the black asphalt of the streets or the glare of the arc lights. Hideyoshi's castle still looms through the factory smoke. That Japan is ours, though misunderstanding and the remorseless march of events have made the new Japan dislike us for a little while.

Sayonara! Matakimasho!

# DISCUSSION

## Athletics, Beneficial and Otherwise

(See page 1609, October PROCEEDINGS; and page 1873 November PROCEEDINGS)

REAR ADMIRAL A. P. NIBLACK, U. S. N. (Retired.)—Doctor Carpenter has recently completed four years' service as Senior Medical Officer at the Naval Academy, where his zeal, intelligence, and progressiveness have resulted in improved supervision both in the gymnasium and in "Misery Hall," in which sprains, bruises, and soreness are treated by approved methods of physiotherapy. Naturally he did not think that mechanical manipulation, or osteopathy, was needed with "posture"; otherwise they would have it in the gymnasium now, and I would have been saved the unpleasant task of "uplifting" and of stepping on toes in the process.

It is said to be always a sign that something is wrong in the Navy when everybody is satisfied, so there is no use mincing words. My friend, Dr. Carpenter, for he is one of the warmest friends I have, says in his criticism of my paper: "Admiral Niblack's statement that the Medical Department is backward in not recognizing the value of osteopathic practitioners for duty on the staff of the Naval Academy gymnasium is evidently based on his belief that osteopathy gives a 'peculiar knowledge' not possessed or required of medical officers . . . . So far as the theory of 'readjustments' is concerned, medical officers would probably agree that this 'peculiar knowledge' holds no interest for them. On the other hand, some, including the writer, believe that osteopathy has utilized a valuable therapeutic aid which has been neglected." That is an excellent statement of my position, but what the Medical fraternity in general has neglected is not only deep massage, as intimated by Dr. Carpenter, but that manual dexterity in "readjustments" and that "peculiar knowledge" which it is necessary to go to an osteopath to get in its most efficient form. This is not saying that doctors can not do it, but that they don't, except with rare exceptions, for I know doctors who can and do.

The ethics of the medical profession, broadly speaking, defines surgery, including fractures, wounds, etc., as one of the legitimate functions of a doctor, and "prescription" as another. In the one, the doctor performs marvels with his skilful hands, and, in the other, he uses a pen. Besides materia medica to draw upon for prescriptions, he has hot and cold applications, electricity, light, massage, baths, rubbings, and mechanical appliances, and all else that physiotherapy has to offer, but it is always someone else that fills the prescription. That is where the osteopath slips

one over on the doctor, for, instead of writing out a prescription, he examines the actual machine, which is dislocated, and by touch, eye, and ear, gets a closer line on the trouble. It is surprising, within the limits of their "peculiar knowledge," and what they claim they can do, how successful they are. Of course, doctors know the bones, muscles, nerves, tendons, and organs of the human body and their functions quite as thoroughly as the osteopaths, but they have not their manual dexterity and touch, merely through lack of experience. There is no reason why they should not have the experience, but very few go after it. It would be better if doctors were also "osteopaths," and much better if osteopaths were doctors. In my experience, I have seen patients, aboard ships and in naval hospitals, all bandaged up, in pain, and off duty, for some "displacement" that an osteopath could remedy in five minutes or less, by the watch. Everyone who has looked into the matter, and is not perverted by ethics, knows of so many cases, other than bone displacements, where pressure or congestion has been relieved with startling results. I mention all this to offset Dr. Carpenter's remark that I "would be the first to recognize the value of physiotherapy if familiar with its applications," whereas it is because I am familiar to a very marked degree with it that I see how inconsistent it is to leave out of physiotherapy, the deep massage, the "manipulation," and the "bone setting" of the osteopathic practitioner.

I hold no brief for osteopathy, but would welcome anyone who could qualify in this matter of "posture." If it is a question of ethics, then I don't think the Navy ought to be kept out of benefits for that reason. It took us a long time to get dentists in the Navy, but this is not a question of having naval osteopaths, although I, for one, would accept all they can do that is good—or better. To illustrate the workings of ethics, Sir Albert Barker, England's most famous "bone setter," to whom doctors in London had freely sent many cases, was knighted in 1921. There was a great stir over it at the time, but as he could not be made a fellow of the Royal College of Surgeons, they recognized his eminent services by easing him off with a title.

The real question is what has osteopathy got to do with "posture." Posture, as now taught at the Naval Academy, is too much of a "pose," which lasts while officers are supposed to be looking. To some it comes natural and easy. To others it is unnatural, owing to previous wrong carriage, to stiffened ligaments, to round shoulders, to bad "poise" of the spinal column, and many other drawbacks which can be corrected by manipulation, and held naturally through corrective exercises. The West Point and Annapolis "military posture" is *not natural,* but is exaggerated enough to allow for some slump in after life.

An osteopath, the best-known one in New York City, who, some years ago, in a few minutes, smilingly relieved me of intense pain for "lumbago," from which I had suffered five days on board ship, by snapping a bone back into place, has just written me as follows: "It certainly pleases me

to know that someone has taken the stand in regard to posture, which I have advocated for the past fifteen years, having had charge for some years of the Bennett School at Millbrook, N. Y., with from one hundred seventy-five to two hundred girls yearly. I believe that faulty posture, whether dependent upon occupational habit, slump, general carelessness, or displacement of vertebra due to injury, or to improper shoes changing the balance at point of contact with the surface of the earth, is the primary factor in ninety per cent of constitutional diseases, and, as you say in your paper, it is necessary to make the subject assume a posture, not because he is made to, but because it is natural. It is impossible to *make* corrections of parts of the body affecting posture if he keeps on with his old original slump when sitting down. I have endeavored to create at all times a correct posture in each one subconsciously, and my efforts in every instance have been crowned with success. Posture is a habit—a pleasant habit if you please—and I find that I am having less trouble in maintaining corrections which I have made when the idea becomes fixed in the subject's mind."

Correct posture should be insisted upon in recitation rooms, in the mess hall, and in study; but, before all else, bodily corrections should be made to make posture natural. It is to be hoped that the rising generation will thus avert the slump into flabbiness which overtakes many officers, who, through incorrect posture bring on constitutional troubles which shorten their careers. The present Surgeon General of the Navy is one of the most progressive kind, and I am quite sure that in co-operation with the Naval Academy authorities, he will see that no feeling of self-satisfaction will stand in the way of common-sense progress. I am not trying to run anybody's else business for him, but am merely speaking for the good of the service we all love, without regard to corps, class, or the dead past.

## Evidence

(See page 643, April, 1923, PROCEEDINGS)

LIEUTENANT COMMANDER J. H. TAYLOR, U. S. Navy.—Thoroughly to analyze Commander Parker's article and set forth at length the misconceptions therein contained would require considerable study and the use of a great many volumes of a law library which are not available to me at sea.

Nevertheless, I believe I can answer some of the issues raised by Commander Parker and of these the general question, "Why is it that these Rules of Evidence are (largely) rules for the exclusion of evidence?"

The answer will not be found in the Court-martial Manual for the reason that no manual of such a size could contain more than a few legal principles for the general guidance of court-martial. These are of themselves often incomplete and inaccurate since they are frequently designed to prevent error in circumstances that might arise and which will actually arise but infrequently. For example, it is seldom required in the civil

courts to prove that the one offering documentary evidence is the legal custodian thereof. In order to avoid error in the one case of a hundred where proof might be necessary it is required in all courts-martial. To accept the requirements of the Court-martial Manual as law must, then, be done in an extremely guarded manner.

Nor can the dicta to be found in the cases be accepted as the law. Practically every case in the books contains unofficial utterances of the judge upon some matter not in issue or relevant to the point being decided, but such dicta is not subject to review by the higher courts and, with all due respect, it is not law. Search the cases and expressions can be found which seem to prove any proposition under the sun when taken alone.

The law will be found in the sum of the cases decided in the courts of last resort upon the point in question. It is necessary to read all the cases, throw out extraneous matter, see what was actually decided upon a material point in issue and from these it may be that the law of the point may be reduced to a comparatively simple statement. Textbook writers have done this work in many branches of the law but their utterances at best are only deductions, in their own words, from the decided cases. Their difficulties are many and their labor is enormous, but in view of these very difficulties is it not easily seen that their statements cannot be relied upon as a full and accurate statement of the law? And if the difficulties of the textbook writer are legion, imagine if you can, the trials that beset an author who must condense the law of evidence into a few pages of the manual.

The specific answer to Commander Parker's general question is set forth in 22 Corpus Juris 158:

> Logic is the controlling force in the law of evidence. An offer by a party to prove a fact in evidence involves an assertion by him that such a relation exists, in reason, as a matter of logic, between the fact offered and a fact in issue that the existence of the former renders probable or improbable the existence of the latter, and the relation thus asserted is termed relevancy. (*Platner and Platner*, 78 N. Y. 90, 95). It is therefore *a basic rule of evidence that whatever facts are logically relevant are legally admissible*, (*Standard Oil Co. and Van Eiten*, 107 U. S. 325.) while facts which are not logically relevant to the issue are not admissible (See cases cited in note 54, 22 Corpus Juris 159); the onus of showing relevancy, intrinsic or in connection with other facts, of a fact offered in evidence, being upon the party offering the evidence. It follows that the rules of evidence are largely those of exclusion * * * * .

The simple answer to the general question is, then, that so much of evidence is admissible that it is easier and simpler to point out those things which, for reasons which may be practical, historical or purely arbitrary, are not admissible.

And the rules of exclusion themselves are, in the main, reasonable rules considering everything. The reasons *for* them, on final analysis, are convincing in the great majority of cases. Those rules which are based on practical grounds are practical, those based on historical reasons are such as are for the protection of everyone from the hysterics of an upheaval in the political world and even serve to a large extent toward prevention

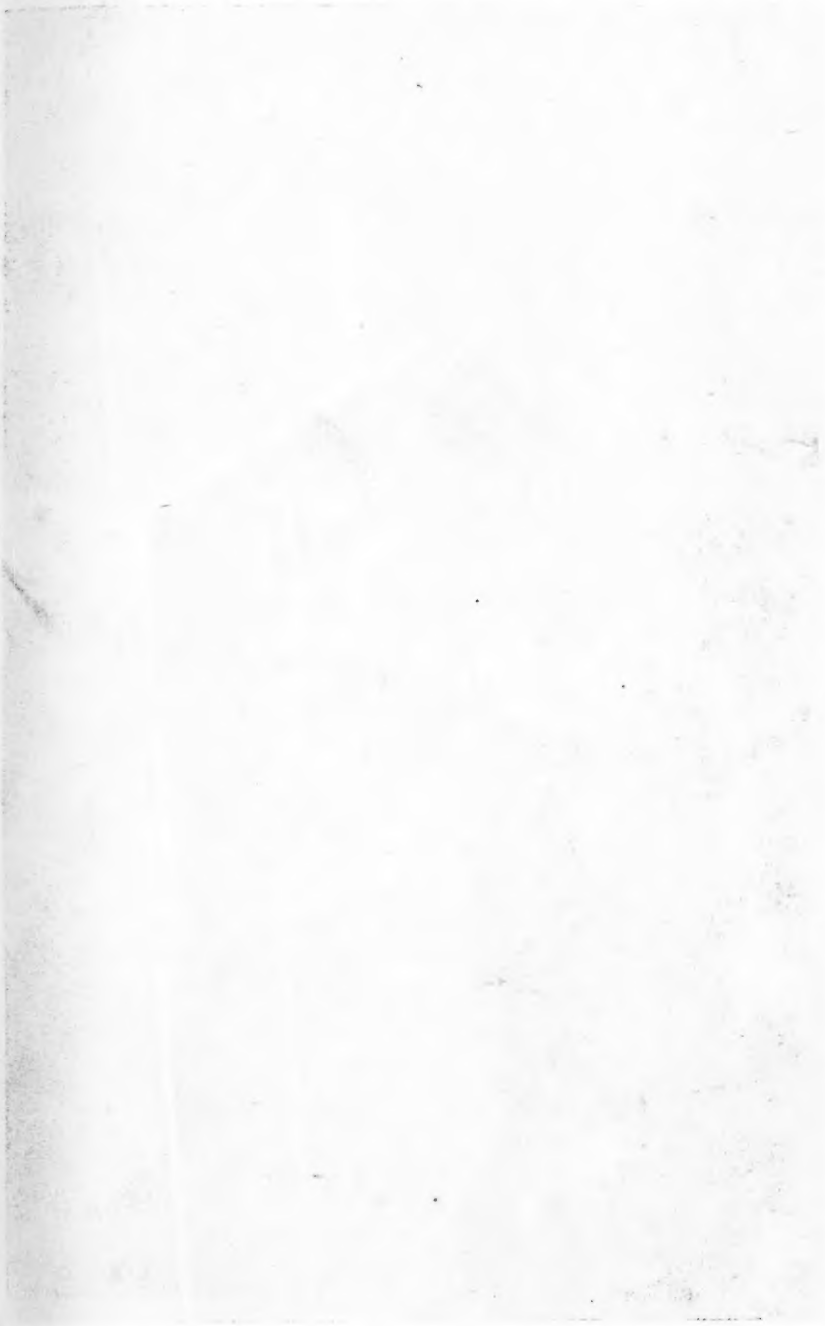
of the resumption of tyranny by those in power, and those rules which seem arbitrary were once reasonable, and are either fundamentally reasonable now or in process of being modified by legislation.

I was extremely fortunate when taking a law course in having for an instructor on the law of evidence Professor Wilson of George Washington University Law School, later of Cornell University. Professor Wilson was not only a profound student of the cases, the generally accepted texts of law (including those of Professor Wigmore whose works are probably the best on the subject) and of legal history, but he possessed an extraordinary faculty for reducing reasons for the rules to simple terms easily understood by the student. Unfortunately my lecture notes are not now available but I am assured that the reasons advanced were, in the main, excellent.

Naturally it is desired to arrive at the truth and it is desired to exclude evidence which may not be the truth. Is there any guarantee that the words of any dying person are the truth? In homicide cases it so often occurred that the victim was the only person, other than the accused, on the scene, so the rule was relaxed at that point. But there was no such pressing necessity in other cases. There were usually other witnesses, or other means of arriving at the truth. And that is the reason for keeping out the unsworn, and too frequently malicious statements, of seriously injured persons. Even at that, involuntary exclamations are admissible. Why? The involuntary exclamation was probably an index to the truth. And under this latter rule (and other similar exceptions) a judge advocate who knows his law of evidence, rather than one who accepts the bold, misleading statements in the manual, can present all the logically relevant evidence to the court.

With regard to evidence of character, if the opinion of the witness is to be taken, just who shall be the witness? Shall the witness be chosen by the accused or by the prosecution? And in either case what kind of a man is the witness that he shall judge? If, however, there can be obtained a statement of what the majority of the community think of the character of the accused is it not more apt to be a fairly accurate estimate than the probably biased opinion of any one of the community? Upon final analysis just what bearing do past acts have upon the probability of a recent act? Would any man of us be content to be tried upon the gabble, guesses, misinformed misconceptions and jealousies of his neighbors? And how many of the ordinary counsel for the accused could bring out the actual truth?

And so long as an informed prosecutor is not too seriously handicapped by the present rules, why should the rules be changed to secure more convictions of the already but little protected enlisted man before General Court-martial? Congress has very recently changed Court-martial procedure in the Army to a degree which makes it extremely difficult to secure convictions in any case. Presentation of a request for mitigation of requirements now in effect for the Navy would doubtless serve only to call attention to the different requirements and bring upon us the same difficulties.



# PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT COMMANDER H. B. HIRD, U. S. NAVY

AND

LIEUTENANT J. B. HEFFERNAN, U. S. NAVY

## GENERAL ARRANGEMENT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## GREAT BRITAIN

BRITAIN TO BUILD SIX 10,000-TON CRUISERS.—London, October 27—Six cruisers of the 10,000-ton type, carrying eight-inch guns, are expected to be added to the British Navy during the next three years, in line with Premier Baldwin's announcement in his Plymouth speech on Thursday. Whether the government will be able to meet two ends with a single Parliamentary appropriation—increasing the Navy and, at the same time, helping to solve the winter unemployment problem in the shipyards—depends upon the speed with which Parliament acts on the naval appropriation.

The plans for the cruisers, which will be the largest allowable under the Washington naval treaty, are in preparation, but the Admiralty officials are not certain about the exact number to be constructed. The Prime Minister said the government had decided to lay down "several" cruisers and the naval authorities hope that this meant that at least six new cruisers would be made available as commerce-protectors within the next three years.—New York *Tribune*, 28 October, 1923.

NEW DESTROYERS.—The new destroyers *Shikari* and *Whitehall* are due to be ready for service in January and February next respectively. The *Shikari* is of the Admiralty *S* type, of 1,075 tons, 27,000 horsepower, 36 knots speed, and an armament of three 4-in. and one two-pounder guns, and two double torpedo tubes. The *Whitehall* is of the larger Admiralty *W* type, of 1,325 tons, 27,000 horsepower, 34 knots speed, and armed with four 4.7-in. and two two-pounder guns, and two triple torpedo tubes.

Ordered in April, 1917, and January, 1918, respectively, from the firms of Doxford and Swan, Hunter, they were towed to Chatham Dockyard for completion about two and a half years ago.

These vessels are the last of the destroyers, of which there were well over three hundred, ordered from British firms during the war. At the time of the Armistice there were ninety-seven destroyers in hand, of which the contracts for forty were canceled, and work on thirty-eight others was stopped. Gradually as the limited amount of money available allowed, progress was resumed on these vessels, which were too far advanced to be scrapped, and by the end of February all will have been completed.—*Army, Navy and Air Force Gazette*, 27 October, 1923.

THE FUTURE STRUCTURE OF SEA POWER.—"If the Government's decision to continue building first-class surface ships was wrong, then we have placed our whole destiny, and our future existence, at the mercy of a more far-sighted rival. We are only preserved from ruin because others have been as stupid as ourselves." This, stated in its plainest terms, is the problem which still divides naval experts; and it will be seen at once that it is of such importance that every other naval controversy is subordinate to it. Whether Singapore should be turned into a great naval base, whether the air service attached to the fleet should, or should not, be part of the naval organization, are obviously points which can only be correctly solved if the main issue is rightly worked out.

For these reasons the lecture delivered by Admiral of the Fleet, Sir F. C. D. Sturdee, on the third instant, at the Royal United Service Institute, is of exceptional interest. To examine "the importance of battleships, cruisers, and suitably placed bases for maintaining overseas communications" is to survey the essential factors of sea power. Nobody is more qualified to do so than the seaman whose name will always be connected with the most brilliant oceanic operations in modern warfare, and who raised the prestige of our arms at one of the darkest moments of the war.

His lecture leads him to the following conclusions: (i) a battle fleet is the only possible counter to the battle fleet of a foreign power. If any state neglects to build one it will be faced with a maritime handicap which no substitute will ever redress; (ii) aircraft may increase the vision of surface ships and so make their gunnery more accurate; but as they cannot engage and fight them decisively, they can never be their rivals. From which it follows (iii) that oceanic communications can only be kept open by large numbers of cruisers, protected by heavy fleets, based on fortified harbors echeloned along the most rival ocean highways, against concentrations of more highly armed vessels.

To these conclusions Sir Percy Scott objected: that, in no strategical plan of war against France could our battleships be put to any use; that the British battleships of the Dardanelles squadron could not face the German submarines; and that the proper counter to a fleet of foreign battleships was a type of vessel of his own invention and design.

The only way of contributing usefully to such a controversy is to see how far the known facts of the naval war support Sir Percy Scott's arguments. The essential duties of a fleet are: (i) to prevent invasion; (ii) to keep communications open for the passage of supplies, and the movement of overseas expeditions, and (iii) to see that the hostile power is denied all similar facilities. Our fleet performed all these duties in the war: could they have been better, or more thoroughly, carried out by a fleet differently constituted?

On the first head we have a very good test case. On April 24, 1916, Admiral Scheer brought out the whole of the High Seas Fleet, and, having

taken his battle fleet to Terschelling, sent his battle cruisers ahead toward the English coast. Early in the morning of the twenty-fifth, therefore, Admiral Hipper bombarded Yarmouth and Lowestoft for a short time, and then retired eastward to rejoin his chief. Except for a few moments, during which Admiral Tyrwhitt endeavored, most unselfishly, but without avail, to interfere with the Germans by means of a flotilla attack, Admiral Hipper was not opposed. The significance of the operation must not be judged by its results. It tested the capacity of flotillas and submarines to defend an unfortified coastline, and proved that they cannot do so. We knew that the German fleet was putting to sea; and a short time afterward, we discovered its objective. Thus forewarned, we concentrated a very large number of submarines in the threatened area, and laid a long line of them in the central part of the Flanders bight, right across the German line of advance and retirement; we then assembled another group off the point of attack. They probably hampered the German admiral, for they were handled with great skill and courage; but they did not thwart the German plan or bring it to a standstill.

Their failure to do so brought home an uncomfortable lesson to us with some force. Nothing had prevented the German admirals from moving across with a large number of transports; and, had they done so, our local flotillas and submarines could not have prevented a landing in force: which would have gone forward unchecked for nearly twenty-four hours —that is, until our main squadrons arrived. Our flotillas and submarines could no longer be counted upon to give our coasts any permanent security. If German troops were not landed in England on April 25, 1916, it was because the German naval staff thought the operation unsound, and not because they lacked the power to carry it out.

Turning to the second of a fleet's essential duties, we have abundant evidence that it can only be performed by a powerful surface fleet; and that submarine flotillas cannot prevent it from doing so. At the beginning of 1915 we had carried one infantry division to the Mediterranean and landed it in Egypt. A year later we had transported fourteen divisions to Salonica, Egypt and Mesopotamia. This enormous movement had been effected in the week of the strongest opposition; for the German Staff, in order to stop our concentration of military forces in this new theater, concentrated in the Mediterranean every submarine not required for operations in the North Sea. In the outcome, their submarine commanders impeded us and added to our difficulties, but they never prevented us from doing as we wished. In other words, the experiment of interfering with overseas movements by means of a submarine fleet has been tried and failed.

There is no better example of the third class of duties which a modern fleet is called upon to perform than the task so brilliantly performed by Admiral Sturdee at the end of 1914. Our sea communications with South America were then threatened by a victorious German squadron which might, at any moment, have attacked the Plate route and endangered our food supply. If Admiral Sturdee had set out to face his antagonist with any squadron but the one allowed to him; had he, in fact, been equipped with a force which lacked the gun power and speed of two of Spee's cruisers, does anybody imagine that he could have achieved his purpose?

Other concrete tests of the power which a submarine fleet possesses against surface craft can be found in the official records of the war. To review them in detail would be, in fact, to write a history of the naval war. Yet, if any conscientious student of the problem takes the trouble to muster the relevant facts and muster them fairly, he will always come to the same result. Submarine operations may, in favorable circumstances,

obstruct a fleet and impede its movements; but all arguments about the power of submarines and aircraft to drive surface battleships from the sea are based on speculation and not on fact.

Admiral Scott's remark about our battleships at the Dardanelles is as deceptive as his other arguments. It is quite true that the arrival of the German submarines in the Straits, combined with their brilliant initial successes, caused us to alter the composition of the naval forces detailed to support the Army; but it is quite untrue that the latter were permanently withdrawn to harbor. They were, from then onwards, relieved of their routine duties as flanking ships and reserved for special occasions. Even though they had been confined to harbor for the rest of the campaign, Sir Percy's "unanswerable" question would only convey a half truth. The *Goeben's* destructive raid upon our blockading forces in 1917 was only possible, because, at the moment we had no surface ships of sufficient force to oppose her. Our very numerous submarines were unable to keep her inside the straits.

In conclusion, it should be noticed that certain quite exceptional circumstances give a peculiar impetus to the controversy. The naval war in the North Sea had features of its own which are not likely to be repeated. The essential characteristics of our operations were, that each side knew when the other was putting to sea, and that each fleet, by the limitations of the strategical chessbroad, was compelled to concentrate in restricted waters, particularly open to every form of minor attack. These things combined to assist submarine operations and make them dangerous; but because they were the basic features of a particular naval war they do not, on that account, become the necessary factors of any maritime operations in which we may at some future time become engaged.—*Engineering*, 26 October, 1923.

Britain's Decision to Expand Her Navy.—London, November 8.—Two decisions of capital importance from the viewpoint of Imperial defense have been reached during the present conference between the King's Government and the Dominion Premiers.

In the first place, the development of Singapore as a fleet base of commanding rank is to be pushed forward with energy, the Australasian delegates having promised generous financial support to the scheme. The date officially set for the completion of the work is 1932, but this is quite likely to be anticipated by several years.

The new battleship dock, capable of taking two superdreadnaughts at once, the machine shops and plant for repairing war vessels and their machinery and the magazines and enlarged oil-fuel depot are all expected to be ready for service by 1930. Singapore is to be strongly fortified against attack from the sea and air, the cost of these defenses being over and above the $50,000,000 it is proposed to spend on the navy yard proper.

Britain aims at converting this Eastern port into a citadel of naval power, from whence the main fleet can, if need be, deploy its full force in the southwestern sector of the Pacific.

Emphasis is laid, however, on the predominantly defensive character of the scheme. Warships pivoted on Singapore could not seriously menace the coast of Japan, which is 2,500 miles distant. They could at most interfere with Japan's maritime trade.

But no one who looks at the Singapore plan objectively can escape the conclusion that it was inspired in the first instance by defensive strategy. These battleship docks, fortifications, etc., are, in fact, designed mainly for the protection of Australia and New Zealand. The danger from the north may be non-existent, but the British Empire prefers to take no chances.

The second major decision reached at the conference concerns the safety of the ocean-trade routes. In an article written for *The Sun* about three weeks ago I ventured to forecast a new cruiser program for the British Navy. This prediction was speedily fulfilled, for the Prime Minister announced on October 25 that a number of new cruisers would be ordered at the turn of the year. Their construction will provide welcome employment for the shipbuilding industry, which is passing through a most critical period, owing to the slump in tonnage of every description, but there are weightier reasons than this for laying down the vessels.

At first sight the British Navy seems to be well supplied with cruisers, forty-six being shown as built and building in an official return published last January. But when this total is analyzed the position is seen in a less favorable light.

Of the forty-six ships in commission or completing thirty-three belong to a small type—3,750 to 4,650 tons—which is not suitable for ocean work. These vessels were specially built for operations in the North Sea, where they proved effective enough, but they have neither the dimensions, radius nor seaworthiness for cruising in the broad ocean. Moreover, none of them can travel at a higher speed than 29 knots and many are so worn out by arduous war service as to be incapable of steaming at anything like this speed today.

Next there are seven larger ships of 5,400 tons, built before the war and consequently obsolete, with a maximum speed of 25½ knots. This leaves only six ships which can be rated as fully effective: namely, four of 9,750 tons and 30-31 knots and two of 7,550 tons and 33 knots.

These six ships alone, the Admiralty claims, possess the qualities requisite for the efficient carrying out of trade-protection duty, and the number is regarded as quite inadequate.

Since the war, it is pointed out, foreign navies have been steadily building cruisers of ocean-going capacity and high speed. The United States has a homogeneous group of ten ships, each of 7,500 tons and a designed speed of 33¾ knots—which has been exceeded in most cases. Further, the Navy Department has a new program of eight 10,000-ton cruisers which Congress will shortly be asked to approve.

The Japanese cruiser force is far more formidable, comprising as it does twenty-three ships of 5,500 tons and upward, all capable of traveling at 33 knots, powerfully armed, weatherly, and having a very extensive radius of action.

This force is to be complete in 1927, and it may not be altogether a coincidence that the last of the new British ships are scheduled for delivery in the same year. According to present arrangement, four will be laid down in the spring of 1924, and if Parliamentary sanction is obtained a second batch of four may be ordered in 1925.

When "maximum prices" were fixed for certain comestibles during the war, it was soon discovered that maxima and minima had become synonymous. Much the same thing has happened with regard to warship displacement and armament since the Washington Conference.

Under the naval treaty future auxiliary ships must not exceed 10,000 tons or carry guns larger than 8-inch caliber. Since that decree was promulgated every government concerned has been designing auxiliary ships up to the authorized limit of tonnage and gunpower.

The four latest Japanese cruisers to be ordered are 10,000-tonners, mounting 8-inch guns. The eight projected United States ships are reported to have a similar displacement and battery, as also have the ships which France and Italy intend to begin in the near future. It is, therefore, not surprising to learn unofficially that Britain's new cruisers will be "somewhere about 10,000 tons, carry 7½ or 8-inch guns, and have machinery for 33 knots speed."

So far there has been practically no criticism of this program in any quarter. Even the most determined economists are forced to admit that, if the ships are needed at all, they might as well be built at once, thereby providing much-needed employment for shipyard hands, who would otherwise be drawing out-of-work pay. A sum fully equal to that which has been saved by the suspension of heavy naval shipbuilding since the Washington Conference will, it is estimated, eventually be absorbed by "doles" and other forms of relief to unemployed shipyard workers.

On the other hand, to build fighting ships solely, or even mainly, for the purpose of providing work, regardless of the political and strategic considerations that necessarily govern the strength of national armament, would be the negation of sound policy.

The naval authorities here, however, emphatically disclaim any such intention. Already the shortage of cruisers has become serious, they declare, and it would in any case have been necessary to lay down more ships next year if the present balance of power were not to be upset.

Nothing is more significant of Japan's resolution to remain supreme in Far Eastern waters than her refusal to allow the earthquake disaster to interrupt the development of her Navy. Faced with a bill of $2,500,000,000 for national reconstruction, she is still spending large sums on naval shipbuilding.

From semi-official information now available the work actually in hand at various Japanese shipyards, Government and private, includes the following: Seven protected cruisers—*Furutaka* and *Kako*, 7,210 tons, 33-34 knots, eight 6-inch guns; *Isudzu, Abukuma, Naka, Sendai*, and *Jintsu*, 5,660 tons, 33 knots, seven 5.5-inch guns. One cruiser-minelayer, *Yubari*, 3,150 tons, 33 knots, six 5.5-inch guns. Seven destroyers of the first class, 1,350 tons, 34 knots, four 4.7-inch guns, six torpedo tubes. Four destroyers of the second class, 865 tons, 33 knots, three 4.7-inch guns, four torpedo tubes. Six submarines of high seas type, 2,000 tons, 17 knots, two 5.5-inch guns, six torpedo tubes. Seven medium submarines of 750 tons.

Contracted for, and to be commenced during the next twelve months: six protected cruisers (two of *Furutaka* class, as above, and four of 10,000 tons, 34 knots, six or eight 8-inch guns), and an unspecified number of destroyers and submarines, not less than twenty-eight in all.

The British naval program announced by Premier Baldwin will doubtless stimulate the movement on your side for reinforcing the auxiliary combatant fleet of the United States, which is, at present considerably below the treaty ratio.

American naval authorities cannot be expected to indorse without qualification the Admiralty's analysis of British cruiser strength, as set forth above. They may argue, with reason, that although a majority of the British ships are deficient in tonnage and speed, they would nevertheless be invaluable for reconnaissance and screening work with the battle fleet, as also for commerce-protection duty on the shorter ocean routes.

The United States Navy, per contra, has no such reserve of cruiser material. Its few old ships in this category, such as the three *Chesters*, the *Charleston, St. Louis, Rochester*, and the eight armored cruisers, are quite obsolete: few, if any of them, being capable of performing useful service in war.

Actually, therefore, the entire resources of the American Navy in effective cruising ships are represented by the ten *Omahas*. If the eight larger ships now projected are built, the number of fully efficient cruisers will reach eighteen, a very modest total, having regard to the size of the battle fleet.

Statistical comparisons of naval strength usually excite the wrath of economists and pacifists, but they are, after all, the only method by which a nation can gauge its requirements for defense.

To pretend that Britain's sea armaments bear no relation to those of the United States, or that America's naval preparedness takes no account of British strength, would be rank hypocrisy. In fact, the Washington Treaty, by establishing the principle of equality as between these two fleets, tends to accentuate the vigilance with which each watches the development of the other.

For this reason no one here would be surprised, and certainly no one could complain, if the British decision to build a number of new cruisers proved to be the one thing that was needed to insure the safe passage of the Navy Department's program through Congress next month.—By Hector C. Bywater, *Baltimore Sun*, 23 November, 1923.

BRITISH BATTLESHIPS TO BOOM EMPIRE'S BUSINESS.—One of the results of the imperial conference in London is that a powerful British Naval squadron is to trot round the globe. It is believed at No. 10 Downing Street that such a cruise will foster the empire's trade and stimulate interest in the fleet. It is a part of the Admiralty's plan, it is said, to urge the Dominions to develop their naval arms. The proposed tour recalls the epochal "swing around the world" made by the United States Fleet in 1908, as ordered by President Roosevelt as a warning to Japan, and which tour was acclaimed as the most remarkable naval accomplishment in the world's history. Evans' great fleet included sixteen first-class battleships.

The British Admiralty has issued the official program of the cruise.

Two battle cruisers, H. M. S. *Hood* and *Repulse*, and five light cruisers, H. M. S. *Delhi, Dauntless, Dragon, Dunedin* and *Danae*, will make the cruise. Rear Admiral Sir Frederick Field will be in command of the battle cruiser squadron and Rear Admiral Sir Hubert Brand of the light cruiser squadron. The *Dunedin* will leave the light cruiser squadron at New Zealand. The two squadrons will separate at San Francisco and will return by different routes.

The following is the full program:

JOINT PROGRAM

| *Port* | *Arrive* | *Stay (days)* | *Leave* | *Ships Concerned* |
|---|---|---|---|---|
| Devonport | ..... | .. | Nov. 27 | All |
| Sierra Leone | Dec. 8 | 5 | Dec. 13 | All |
| Cape Town | Dec. 23 | { 6 | Dec. 29 | L. C.'s |
| | | { 11 | Jan. 3 | B. C.'s |
| Durban | Jan. 1 | 4 | Jan. 5 | L. C.'s |
| Dar-es-Salaam | Jan. 12 | 5 | Jan. 17 | 1 L. C. |
| Zanzibar | Jan. 12 | 5 | Jan. 17 | B. C. |
| Mombasa | Jan. 12 | 5 | Jan. 17 | L. C.'s |
| Trincomali | Jan. 27 | 4 | Jan. 31 | All |
| Penang | Feb. 4 | 4 | Feb. 8 | L. C.'s |
| Port Swetten'm | Feb. 5 | 4 | Feb. 9 | B. C.'s |
| Singapore | Feb. 10 | 8 | Feb. 18 | All |
| Fremantle | Feb. 27 | 3 | Mar. 1 | All |
| Albany | Mar. 2 | 4 | Mar. 6 | All |
| Adelaide | Mar. 10 | 5 | Mar. 15 | All |
| Melbourne | Mar. 17 | 8 | Mar. 25 | All |
| Hobart | Mar. 27 | 9 | Apr. 5 | All |
| Jervis Bay | Apr. 7 | 4 | Apr. 11 | All |
| Sydney | { Apr. 12 | 11 | Apr. 23 | B. C. |
| | { Apr. 12 | 3 | Apr. 15 | L. C.'s |
| Brisbane | Apr. 17 | 8 | Apr. 25 | L. C. |
| Lyttleton | May 1 | 7 | May 8 | L. C. |
| Wellington | Apr. 27 | 11 | May 8 | B. C. |
| Auckland | May 10 | 7 | May 17 | All |
| Fiji | May 21 | 6 | May 27 | All |
| Honolulu | June 6 | 7 | June 12 | All |
| Esquimalt | June 21 | 12 | July 4 | L. C. |
| Vancouver, Vic | June 21 | 12 | July 4 | B. C.'s |

LIGHT CRUISER PROGRAM

| | | | | |
|---|---|---|---|---|
| San Francisco | July 7 | 4 | July 11 | All |
| Magdalena Bay | July 14 | 3 | July 17 | L. C.'s |
| Callao | July 28 | 5 | Aug. 2 | ..... |
| Valparaiso | Aug. 7 | 5 | Aug. 12 | L. C.'s |
| Talcuhano | Aug. 8 | 5 | Aug. 13 | L. C.'s |
| Punta Arenas | Aug. 17 | 1 | Aug. 18 | ..... |
| Falkland Is. | ..... | .. | ..... | Part of squadron |
| Bahia Blanca | Aug. 21 | 5 | Aug. 26 | 1 L. C. |
| Buenos Aires | Aug. 28 | 5 | Aug. 28 | 2 L. C.'s |
| Montevideo | Aug. 23 | 5 | Aug. 28 | 1 L. C. |
| Rio de Janeiro | Sept. 1 | 7 | Sept. 8 | ..... |
| Cape Verde | Sept 18 | 2 | Sept. 20 | ..... |
| Home ports | Sept. 28-29 | .. | ..... | ..... |

BATTLE CRUISER PROGRAM

| | | | | |
|---|---|---|---|---|
| San Francisco | July 7 | 4 | July 11 | All |
| Panama | July 23 | .. | ..... | |
| Colon | ..... | .. | July 24 | |
| Jamaica | July 26 | 4 | July 30 | |
| Halifax | Aug. 5 | 10 | Aug. 15 | |
| Quebec | Aug. 18 | 14 | Sept. 2 | |
| Nova Scotia or Newf'dland | Sept. 4-17 | .. | | |
| Home ports | Sept. 28-29 | | | |

## Value of the Cruise

The itinerary of the world-cruise of British warships is more comprehensive than had been expected, owing to the excellent plan of separating the two classes of cruisers at certain stages and of further dividing up the light cruisers in Australian and South American waters. This makes it possible for many more towns, and a much larger number of people, to obtain a sight of the vessels, says the naval correspondent of the *Times*.

The extent of the cruise makes it of exceptional importance in the history of the navy. Other similar voyages have lasted longer, but this was because the ships were slower and did much of their journey under sails. As compared with the ten months during which the ships under Sir Frederick Field will be absent from England, the flying squadron, under Sir Godfrey Hornby, was away from June 19, 1869, to November 15, 1870, but it touched at only fifteen places—Funchal, Rio de Janeiro, Montevideo, the Cape, Melbourne, Sydney, Hobart, Lyttelton, Wellington, Auckland, Yokohama, Esquimalt, Honolulu, Valparaiso and Bahia. All of these places except Funchal and Yokohama, will be visited by the present squadron, which will touch also at about thirty other ports.

It must be a source of pride that some two-thirds of the ports to be visited by the cruisers will be British. Not until June 6 of next year, when they will drop anchor at Honolulu, which belongs to the United States, will the vessels call at a foreign port. The battle cruisers, indeed, which will separate from their lighter consorts on leaving San Francisco in order to come through the Panama Canal, will call at only four ports of another country, and that country the United States. The vessels will visit several places which came into prominence in the war, such as Dar-es-Salaam, the chief port of what used to be German East Africa; Zanzibar, where the light cruiser *Pegasus* was caught and destroyed by the *Königsberg*; Penang, where the *Emden* appeared with a dummy funnel and sank a Russian cruiser and a French destroyer; and the Falklands, forever to be associated with Sir Doveton Sturdee's victory. The program includes some port or ports in all the great dominions.

## First-Class Fighting Units

The value of such a cruise is bound to be considerable, for there are many directions in which it should be productive of good results. It will

PACIFIC OCEAN
EQUATOR
ASIA
EUROPE
BRITISH ISLES
Devonport
Halifax
ATLANTIC OCEAN
CANADA
Vancouver
Quebec
Quimalt
UNITED STATES
San Francisco
Victoria
Honolulu
Magdalena B.
PACIFIC OCEAN
Fiji Is
Auckland
WELLINGTON
Lyttelton
Brisbane
SYDNEY
Jervis B.
Hobart
AUSTRALIA
Jamaica
Clverde Is
Sierra Leone
AFRICA
Mombasa
Zanzibar
Dar es Salaam
Durban
CAPE TOWN
INDIAN OCEAN
Trincomali
INDIA
Singapore
Fremantle
Albany
ADELAIDE
MELBOURNE
Brisbane
SYDNEY
Jervis B.
Hobart
AUSTRALIA
PANAMA CANAL
Callao
SOUTH AMERICA
Valparaiso
Talcahuano
Rio de Janeiro
Montevideo
BUENOS AIRES
Bahia Blanca
Falkland Is
Santa Arenas
Strait of Magellan
REFERENCE.
Combined Squadrons
Battle Cruisers
Light Cruisers

show the British flag in ports where it is now seldom seen. The flag will be displayed in real fighting units of first-class efficiency. A reminder will be given of the pre-eminence of British shipbuilders and marine engineers. Trade will be stimulated by such an exhibition of our naval strength, upon which our oversea commerce ultimately depends. The cruise will provide a splendid opportunity for long-distance steaming trials. It will give valuable experience to the officers and men. The influence on recruiting, and especially on the class of recruits, should be entirely good. Finally, the voyage should prove an object lesson to the Dominions, united as they are to the Motherland by one sea, of what is necessary to keep open our sea communications.

The battle cruisers *Hood* and *Repulse,* which will be the chief vessels to make the cruise, belong to the battle cruiser squadron of the Atlantic fleet, of which the *Renown* and the *Tiger* are now out of commission and under repair. The *Hood,* flying the flag of Rear-Admiral Sir Frederick Field, the late third sea lord of the Admiralty, is the heaviest man-of-war in the world, with a displacement of 41,200 tons. The *Hood* was begun in 1916, modified in design after the Battle of Jutland, launched in 1918, and completed in 1920. The *Repulse,* of 26,500 tons, is a much lighter type of battle cruiser, built for a special purpose in the war, and armed with six, instead of eight, 15-in. guns.

The first light cruiser squadron is composed of five sister-ships of the *D* class, the *Delhi,* flagship of Rear-Admiral the Hon. Sir Hubert Brand, the *Danae,* the *Dauntless,* the *Dragon,* and the *Dunedin.* Launched in 1917-18, and completed in 1918-19, these vessels are of 4,650 tons, and are armed with six 6-in. guns. With the exception of the *Emerald* and the *Enterprise,* larger ships armed with seven 6-in. guns, they are the latest class of light cruiser for general service in the royal navy. From the standpoint of speed alone they have been surpassed by several ships in the Japanese and American navies, having been designed for twenty-nine knots, but their sea-keeping qualities are good. The *Hood* and the *Repulse,* although so much heavier, are both good for thirty-one knots or more.

The temporary absence of these seven important ships from home waters will not only mean a big reduction in the Atlantic fleet, which will be without any battle cruisers, and will have only five light cruisers, but will also involve a scarcity of cruisers ready for service at home. Only oil-burning ships can now be reckoned as in the first class in this category, and of these the number available is only two, the *Canterbury* at Portsmouth and the *Calliope* at Chatham, unless those on instructional work, such as the *Champion,* tender to the torpedo school, are taken.—*Boston Transcript,* 10 November, 1923.

British Fleet at Spithead for First Time Since 1914.—Portsmouth, England, November 3.—The proud gray fleet of Britain that kept the seas clear for the Allies and closed to the Germans during the war assembled today at Spithead and steamed in review past the Premiers of all the dominions where flies the Union Jack. It was the first muster of Britain's naval strength at Spithead since the memorable day in July, 1914, when King George and members of his Parliament watched the going to sea of the ships which a few days later were at war.

### Only Seventy-two Ships in Armada

Not one of the mighty men-of-war which passed out of the historic road-stead that day had a place in the armada which the statesmen from all over the far-flung empire—the delegates to the Imperial Conference sitting in London—watched in their operations this afternoon. Only a

few of those pre-war ships ride the waves today. Some of them were sunk during the hostilities and others have been broken up in the carrying out of the voluntary scrapping of naval might to which the nations agreed at Washington. Those remaining are stationed at foreign stations or are assigned to training and other subsidiary duties.

Today's entire naval assemblage, from the *Hood,* the heaviest and largest man-of-war afloat, down to the tiniest auxiliary craft, numbered seventy-two vessels, the smallest number of naval vessels mustered at a formal British fleet review, within living memory, and this fact is taken in England as a visible reminder of what the Washington agreements have meant. It was almost entirely a product of the war, the oldest ship in the line this afternoon being the *Queen Elizabeth,* completed in 1915.

### Figures Show Shrinkage

The fleet of July, 1914, embraced fifty-five battleships. Now there are but eighteen of this principal class in the entire Navy, eight of which were in line in this afternoon's operations. Instead of four battle cruisers, as in 1914, there were but two, while the twenty-six light cruisers of nine years ago had been reduced to twelve.

Individually the ships are more battle-worthy, with heavier guns, greater speed and more driving power, but taken together they are actully less powerful than the fleet of 1914.—*Baltimore Sun,* 4 November, 1923.

## FRANCE

French Navy Notes.—Admiral Dumesnil at Work: Progress of Units in Hand and Criticisms of their Designs: Are the 8,000-ton *Duguay-Trouins* a Good Investment? Mastodon Liners Ordered at St. Nazaire.—Extensive use of flying auxiliaries, either for scouting or attack—such is the change Admiral Dumesnil has introduced in the training of the Toulon force: a dirigible and a seaplane squadron to take a part in fleet exercises. Also, the strategic use of the Corsican aerial bases, in conjunction with the battle squadron, is to be thoroughly investigated in co-operation with Admiral Fatou, a believer in the immediate possibilities of air power.

Satisfactory progress is being made with the 8,000-ton cruisers. The *Duguay-Trouin,* at Brest, is shipping her boilers, which are of the small tube type and were manufactured at Indret, near Nantes. Should no delay be experienced in the delivery of turrets, guns, and ammunition, the first of French *croiseurs legers* could easily be made ready to hoist the pennant by the end of next year. Similarly, motors are being got ready for the *Lamotte-Piquet,* in which 4,500 tons of material have been worked at Lorient, and even for the *Primauguet,* that is in the early building stage at Brest. Without undue optimism it may be taken for granted the French Navy will early in 1926 array a small but extremely fast light cruiser squadron, fit for ocean work, and that will cost some 230 million francs.

Bitter criticisms are being made of these cruisers, though they are acknowedged to represent in several respects an advance on any cruiser design that has as yet come to light. For the first time defense against aerial bombs and chemical shells has been taken into consideration, and the twin 155-mil. turrets, with their appliances for ventilation and keeping out poisonous gases, offer tolerably good protection to gunners under new conditions of offense. Also, the motor part has been studied with minute care, and no doubt is entertained that the speed will exceed 35 knots at service load.

All the same, a growing number of naval men consider these fine vessels to be *tours de force d'ingenieurs,* engineering freaks, too perfect, too finely cut in the matter of weight calculations for the rough wear and tear of

ocean warfare; and especially, they question, whether the three *Duguay-Trouins* are really a paying investment from a strategic and tactical standpoint, in the light of war lessons and of subsequent constructional developments. The selection of an inferior caliber—155-mil. against 7.5 for the British *Hawkins* and 8.2 inches for the projected cruisers of all other Powers—they consider as a great blunder after what we know of the heavy penalty the Boches paid for pitting 4.1-inch weapons against 6-inch guns. The *Duguay-Trouins* are the *Emden, Dresden,* and *Leipsic* of to-morrow, destined to run for shelter instead of fighting, until they ultimately and inevitably fall a prey to the 10,000-ton and 8-inch gunned fast cruisers of to-morrow. Numerous points *d'appui* (Dakar, Fort de France, Diego-Suarey, Saigon, and Nouméa) will be needed with a view to rescuing and sheltering those "weaklings," hares rather than greyhounds, every time they venture on the wide ocean.

To such contentions *Section Technique ingenieurs* retort, first, that the lesson of Boche light 4-inch gun cruisers does not apply to the *Duguay-Trouin* for the reason that the new 155-mil. gun is a long-range weapon, able to strike at 23,000 mèters, and at that distance to penetrate armor decks in any light cruiser, and with telling effects; secondly, it is not possible, by raising the displacement from 8,000 to 10,000 tons, to produce a ship mounting 8-inch guns (each weapon weighing over twice as much as the 6.1-inch guns), and having as good all-round protection, and speed and radius of action as high—at least with twin turrets—for designs are being prepared with 8-inch quadruple turrets on the Boyère principle so made as to add to the structural strength of the cruiser and to provide ideal protection against gases and bombs.

An agreeable feature in the new cruisers is that they will have two, but very wide, funnels only—one funnel for each 60,000 h.p. The 11,000-ton *Jeanne d'Arc* has six funnels for 30,000 h.p.; at the same rate the *Duguay-Trouin* would have twenty-two or twenty-four funnels! The multiplication of the number of funnels was a ridiculous blunder at the time when only shells and splinters were to be feared; it would be a mistake much worse today when fighting ships are certain to be the target for no end of exploding and asphyxiating missiles dropped from the heavens. Smoke stacks are a growing source of danger, and the day will be welcomed when warships will be able to do without them.

The 2,400-ton destroyers are proceeding at various rates. The *Jaguar* will be launched this week at Lorient, and the *Panthère* will take her place on the stocks. The five small-tube boilers for each of these *contre-torpilleurs* are being prepared at Indret. The Nantes-St. Nazaire center has the lion's share in that class of work. The *Chacal* is very advanced, and will be launched this year at the Penhoet yard; not quite so satisfactory is the progress of the *Leopard* and *Lynx*, in hand at the Chantiers de la Loire, also in St. Nazaire. The sixth of the series, the *Tigre*, is in the early building stage at Chantiers de Bretagne, Nantes. It is probable all these boats will be in the water by March next and ready for trials for December, 1924. An effort at least is to be made in that direction, though the dividing of the command between too great a number of firms has been a regrettable blunder that is not calculated to speed up work. In constructional quarters these 126-meter-long destroyers are admired, as they provide an extremely high military utilization of the displacement and fully benefit from technical progress up-to-date. On the other hand, old constructors are grumbling: too precise and minute is the work, in their opinion, and not enough margin allowed. Still, it is remarked that, relatively to their displacement, the *Jaguars* carry less armament than most Italian destroyers, and even less than the ex-Boche *Admiral Senès*, while being made of superior steel. Compared with Italian destroyers of 1,500

tons of the *Aquila* type, that are "eaten up" by the sea when steaming at over 30 knots, the French 2,400-ton *contre-torpilleurs* have the outward aspect of cruisers and also the habitability; and, all points considered, they cannot be beaten on the same displacement basis.

The 1,460-ton *Simoun* is rapidly progressing at Penhoet (St. Nazaire), and is expected to be floated in January, as also the *Sirocco*, in hand at the Quevilly yard (same firm). At Bordeaux the *Tramontane* was laid down in June last, the *Typhon* has just been laid down, and it will be next week the turn of the *Trombe* at Harfleur (same firm). It is intended to have the 12 *torpilleurs d'escadre* of that type available by December, 1924, despite the delays up to the present experienced in the delivery of materials. In future commands better methods will be adopted, wholesale dispersal of orders having been found to work against the interests of efficient and prompt execution.

None too rapid is the progress of submarines, the bulk of which has been ordered at Cherbourg. The 1,400-ton *Souffleur* is due to be launched on February 22 next, the *Requin* on April 18, and the *Narval* early in June. There are no boats quite similar in the British Navy. Torpedo work is their *raison d'être:* weak guns, but powerful and numerous torpedoes.

The St. Nazaire shipbuilding center, that was hardly hit by the industrial crisis, is to be revived anew and to resume its traditional place as France's premier constructional yard. Besides having in hand four torpedo units and motors for cruisers, it will receive, very likely, orders for two 10,000-ton and 35-knot cruisers, to be commenced early in 1925. Moreover, the Penhoet *chantier* will commence in December next a first-class liner for the New York route, to be called the *Verdun*, that will excel the fine *Paris* and be as large as the St. Nazaire capabilities permit: viz., 40,000 tons, 80,000 h.p., 25 knots. She will be ready by the end of 1926, and will be the fastest *paquebot* in service. A sister ship, *La Marne*, will be ordered next year. A third, *Alsace-Lorraine*, is projected. In war time these State-subsidized liners will be used as auxiliary cruisers and sea-plane-carriers.—J. B. Gautreau.—*Naval and Military Record*, 17 October, 1923.

FRENCH NAVAL CONSTRUCTION.—. . . A particularly interesting unit of the program is the *Béarn*, laid down in 1914 at La Seyne as a battleship, but now completing as an aircraft-carrier. She will displace 25,200 tons and carry an armament of eight 6.1-inch guns, six 3-inch A.A. pieces, and six torpedo tubes. With a designed speed of only 21 knots she will be considerably slower than our two latest carriers, the *Hermes* and *Eagle*. Six ships of a type new to the French Navy are the "super-destroyers" of the *Jaguar* class, displacing no less than 2,400 tons. With their speed of 35½ knots and a battery of six 5.1-inch they should be more than a match for the larger destroyers now in existence. They are in fact small but exceedingly swift cruisers, lineally descended from the torpedo-gunboat of thirty years ago.

### Destroyers and Submarines

Twelve smaller destroyers, known as the *Bourrasque* class, are building under the same program. Their tonnage is 1,400 tons, which makes them larger than any British destroyer except those of the latest flotilla leader class, but the designed speed of 33 knots is somewhat lower than that of our big *V* and *W* boats. On the other hand, they have in their four 5.1-inch guns a much heavier armament. The much-discussed submarine program comprises only twelve boats, though a great many more have been authorized under the second part of the Navy Bill, which received Parliamentary sanction a few months since. Six of the twelve are ocean-going vessels of 1,438 tons in diving trim, with a surface velocity of 16

knots and a radius of 7,000 knots. As they are to carry a 3.9-inch gun, ten 21.6-inch torpedo tubes, and a supply of sixteen torpedoes, they will be potent instruments of offense. But most French naval officers are in favor of building much larger submarines for work on the high seas, and those lately authorized are expected to be of 2,000 tons or more.

The other six boats now constructing are quite small, according to modern ideas, displacing only 750 tons when submerged. Their surface speed of 14 knots has been criticized in France as insufficient. They are armed with one 3.9-inch gun and eight torpedoes, and in general design are said to approximate to the typical German *U*-boat type, which certainly proved itself seaworthy, and reliable. All the vessels enumerated above are due to be complete by the end of 1926, at which date considerable progress should have been made with the second half of the program. It will be seen, however, that "the new French Navy," of which there has been so much talk in certain quarters here, is a very modest affair after all.—*Naval and Military Record,* 10 October, 1923.

## GERMANY

Strength of the German Fleet During the War.—While both the strength and distribution of the German naval forces at any given period of the late conflict were within the knowledge of the British Admiralty, the general public was naturally less well-informed on this point, and even today there is a tendency to underestimate the material strength of the German Fleet during the war. It is therefore of interest to find in the *Marine Rundschau* a fairly detailed account of the High Sea Fleet and its ancillary forces as they existed in September, 1918—two months before the armistice. At that date the German Commander-in-Chief had at his disposal in the North Sea the following ships: Three battle squadrons, comprising in all eighteen Dreadnaught battleships; five battle cruisers; twelve light cruisers; seven torpedo flotillas, consisting of two flotilla cruisers and seventy-seven boats; four submarine flotillas, consisting of a light cruiser as leader, ten torpedo boats, and about seventy submarines; seven airships, one cruiser fitted for carrying aeroplanes, and two aircraft-carriers. The naval aeroplanes on board ship and at the shore stations numbered 152 machines. For patrol and escort duty with submarines there were two escort flotillas and one North Sea patrol flotilla, made up of 186 steam trawlers, forty torpedo boats, and twelve boom-breakers (*Sperrbrechern*), besides fourteen half-flotillas comprising more than 190 vessels of miscellaneous types for minesweeping duty, and a number of fleet auxiliaries and hospital ships. In addition, there were eighty-five vessels for patrol and harbor defense under the orders of the admiral commanding North Sea defenses.

Compared with this concentration in the North Sea, the German forces in other waters were of meager strength. The Baltic area was divided into two commands—Western and Eastern. In the former there were one light cruiser, four auxiliary minelayers, one air-craft-carrier, a torpedo flotilla of twelve boats, a patrol flotilla of about seventy trawlers and thirty motor launches, and a net-laying squadron for anti-submarine duties. In the Eastern Baltic command, with headquarters at Libau, were the old coastal ironclad *Beowulf* as flagship; four German and five Finnish minesweeping divisions, consisting of two large parent ships for motor boats and 145 other vessels; five torpedo boats, twelve colliers, tankers, and supply ships; four hospital ships and two transports. The Baltic naval flying service had sixty-three war and 229 training aeroplanes.

An immense quantity of material was employed in connection with the training and experimental stations at Kiel. For instructional purposes there were more than twenty-five submarines, an equal number of torpedo

boats, many steamers, trawlers, and one cruiser. Here the submarines were taught how to attack enemy convoys, represented by merchantmen of various types under full naval escort. The Kiel armada was further swollen by ships attached to the torpedo, mine, and gunnery schools, ranging from battleships to old torpedo boats and trawlers.

On the Flanders coast (at Bruges, Zeebrugge, and Ostend) were three torpedo flotillas with a total of thirty-three boats and one submarine flotilla of twenty boats, together with seventy-two small vessels, such as minesweepers, patrol, distance-controlled and motor boats, and about 100 aeroplanes.

The "Mediterranean Division" at Constantinople comprised the battle cruiser *Goeben*,* three submarines, and a number of auxiliary ships. Also operating in the Mediterranean were two submarine flotillas and, for a short period only, a squadron of submarine cruisers about twenty-four boats in all, based upon the Australian ports of Pola and Cattaro. In the closing months of the war a German naval detachment was stationed at Sebastopol, in the Crimea, with thirty-six minesweepers, motor boats, and steamers under its orders. This detachment was charged with the repair of the Russian warships which had fallen into German hands, but it does not appear that any marked progress was made in this respect. Finally, there were naval flying stations at Constanza and Xanthi.

As the industrial energies of the nation were largely occupied in meeting the requirements of the Army, the amount of new heavy construction that could be undertaken for the Navy was necessarily very limited. Thus, during the four years of war only six new capital ships joined the fleet, and most of these had been well advanced in construction on the outbreak of hostilities. The number of light cruisers steadily diminished, as the losses in this type far exceeded the reinforcements. Twenty-nine were in service in August, 1914, as against only eighteen in September, 1918. When the war opened Germany had twenty-two pre-Dreadnaught battleships, the whole of which were fit for active service two months later. It soon became evident, however, that these ships were too vulnerable to the attack of modern torpedoes and mines to be of any real value for duty with the fleet, though a squadron of them was present at Jutland. Early in 1916 most of the pre-Dreadnaughts were paid off, their crews being transferred to the submarine and minesweeping flotillas, and their guns removed for service on the land front. The old armored cruisers were dealt with in the same manner, after having served for a time in the Baltic.

From a strength of 100 boats at the outset of war the destroyer establishment had increased to 194 boats by May, 1917, but from that time onward this type suffered very severe casualties, which eventually reduced the total to 168. In August, 1914, the naval air service comprised three airships, six seaplanes, and six aeroplanes. Three years later there were twenty-one airships in commission, but thereafter the number dwindled very rapidly, only nine surviving late in 1918. On the other hand, the aviation service had grown by September, 1918, to more than 775 seaplanes and 360 land machines. Notwithstanding heavy losses, the submarine fleet continued to develop all through the war, the total number of boats in each successive year being as follows: August, 1914, twenty-seven; December, 1915, sixty-three; October, 1916, 128; June, 1917, 154; September, 1918, 180. . . .—By Hector C. Bywater, *Naval and Military Record*, 17 October, 1923.

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Exactly what part the ex-Kaiser played in directing military strategy is still a matter of speculation, but it has been proved beyond dispute that

* This official enumeration of the German naval forces makes it clear that the *Goeben*, despite her nominal transfer to Turkey, was regarded throughout the war as a German naval unit.

he was largely responsible for dictating the strategy pursued by the German Fleet. There is on record his notorious order of August, 1914, virtually forbidding his big ships to stir beyond their fortified anchorages. The effect was to yield without a blow the command of the sea to the British Navy at a stage of the war when bold action by the German Navy must have produced far-reaching results.

It is clear from recent admissions by German historians that William stood in mortal fear of anything happening to his precious fleet. He could approve without demur orders that sent entire divisions of troops to their death, but the bare notion of his battleships having to face shot and shell seems to have filled him with dread. Documents that shed further light on this matter, as well as on some of the more obscure episodes of the war at sea, have recently come into my hands by way of Berlin.

At the end of July, 1914, when British intervention in the impending conflict had become more than probable, Admiral von Tirpitz evolved a plan for delivering a hammer stroke at the Grand Fleet immediately after Britain had declared war. It is but fair to say that the German naval leaders never appear to have contemplated any act of aggression prior to the declaration of war, though they could have found numerous precedents for doing so—for example, Togo's torpedo attack on the Russian fleet at Port Arthur hours before the Czar's Government had been apprised that Japan had decided to fight.

Tirpitz had such implicit confidence in the efficiency of the naval weapon he had forged that he was quite ready to take on the whole British Fleet in a stand-up fight. The High Sea Fleet, having been hurriedly recalled from its Norwegian cruise, returned to German ports on July 28, 1914. For the next few days all ships were feverishly coaling, taking in munitions and stripping for action. On August 2-3 the ships based upon Kiel passed through the canal and joined up with the North Sea squadrons.

The British ultimatum was received in Berlin at 4 P. M. on August 4, to expire at midnight. All that evening the chief of the naval staff, supported by Tirpitz, was striving to get the Kaiser's permission for the fleet to put to sea, so that it should be ready to give battle to the British at any moment.

Elaborate plans had been made for the tactical co-operation of all units in an action which, had it taken place, might have jeopardized that British command of the sea which was absolutely vital to the Allied cause. Even a partial German success would have thrown all the British plans into confusion. That the expeditionary force would not have been sent to France if the sea routes were menaced is perfectly certain; yet the retention of those 80,000 fighting men in England would probably have given Germany a complete and overwhelming victory on the western front in the first month of war.

There would have been nothing to check the onrush of the enemy's right wing down the Channel coast, the crucial battle of the Marne would have remained unfought, and, humanly speaking, nothing could have prevented the German armies from entering Paris. These are the results that might have attended a bold sortie by the German fleet at the beginning of the war.

But happily for civilization the Kaiser refused to risk his ships. His orders were imperative: The battle squadrons were to remain in port; not even the torpedo boats and submarines were to be sent against the enemy. Thus, at the critical moment, the one weapon that might have secured a swift and decisive success for German arms was condemned to inactivity by the Kaiser's command. Thereafter the High Sea Fleet ceased to count as a capital factor in the war. Nearly two years later it fought the battle of Jutland, but by that time the powerful reinforcements accruing to the British Navy had made a decisive German success impossible.

By common consent of foe and friend, Admiral Count von Spee was the ablest and most gallant of all Germany's sea captains that fought in the World War. When news reached Berlin that this valorous officer had crossed the Pacific and annihilated a British squadron off the Chilean coast it was assumed, as a matter of course, that prompt and energetic measures would be taken to facilitate his safe return to the Fatherland.

Plans to this end were, in fact, prepared. It was proposed that two battle cruisers should break out into the Atlantic, join hands with Von Spee, and then fight their way back to German waters. Nor was this plan so hazardous as it seemed. On learning that German battle cruisers were in the Atlantic the British Admiralty would have been compelled to send similar vessels to hunt them down, for the Western Ocean was at that time furrowed by the keels of hundreds of ships bringing troops and supplies, and it would never have done to leave these formidable German raiders at large.

But the pursuit, to be effective, must have involved the dispatch of every available battle cruiser. Consequently the Grand Fleet, bereft of all its ships of this class, would have had nothing with which to counter operations by the two German battle cruisers that remained in the North Sea, for their great speed enabled them to elude the slower battleships without any difficulty. They might have raided the Allied lines of communication in the lower North Sea, and even in the Channel, with comparative impunity. The entire naval situation would have been modified to the detriment of the Allies.

Nor could it be doubted that Von Spee would have had a good chance of getting back to Germany if two or even one battle cruiser had been sent to his assistance, for the ocean is wide, the field of vision limited, and it was shown time and again that the British line of blockade was penetrable by ships under resolute commanders.

Von Spee himself believed that the battle cruisers *Seydlitz* and *Moltke* were coming out to meet him, or so it is declared by survivors of his squadron. But in the end they were not allowed to sail; the Kaiser's "safety first" order again prevailed, and Von Spee was abandoned to the doom that speedily overtook him at the Falklands.

The failure of the much-vaunted *U*-boats to make any impression on the Grand Fleet is always ascribed in Germany to an order that forbade them to attack warships and instructed them to concentrate on the sinking of merchant vessels. An order to this effect was undoubtedly issued —but only to boats specially detailed for commerce destruction.

Evidence is now available to prove that German submarines repeatedly attempted to torpedo battleships of the Grand Fleet and that these attempts continued right to the end of the war. One of the most daring of them was carried out by the famous Commander Otto Weddigen on March 18, 1915, when, after narrowly missing the battleships *Marlborough* and *Neptune* with a salvo of torpedoes, his submarine was crushed like an eggshell by the ram of the dreadnaught and sent to the bottom with all hands.

Rarely did the Grand Fleet put to sea without being shadowed by *U*-boats, but so well was it guarded that the lurking enemy never succeeded in driving a torpedo home. During 1917-18 one division alone of the Grand Fleet—comprising the six United States battleships under Admiral Rodman—withstood half a dozen attacks without a casualty. The *Florida* had four torpedoes fired at her, the *New York* three and the *Delaware* two, but in each case the telltale "air stripe" was observed in time and the attack evaded by a touch of the helm.

It is important that these numerous and invariably futile attacks should be recorded, affording as they do strong evidence that the battleship has

little to fear from submarines so long as it is skilfully handled and efficiently screened by its satellites.

Space disallows more than a brief allusion to other disclosures now made. They include an account of the preparations that were in train for waging *U*-boat warfare on the American coast during 1919. A considerable number of specially large cruiser-submarines had been built for this purpose.

They were to have remained off American ports for months at a time replenishing their fuel and ammunition from "mobile floating bases," these being large submarines fitted up for the storage of oil, torpedoes and other supplies. One, at least, of these submersible depot ships was nearly ready for service at the time of the armistice.

Another project that did not mature was the construction of Krupp's "dreadnaught-destroyer." This was to be a vessel larger than any warship hitherto built, with a low freeboard to minimize target area, plated from end to end with massive armor and mounting a number of 18- or 20-inch guns, whose enormous shells would have pulverized any battleship they hit.

The idea was to build four of these mastodons, which would constitute an "iron division" superior in fighting power to eight or a dozen ordinary battleships, and use them as the spear-head in a great attack on the British fleet. What would have happened in that event one can only surmise, but if the ships had proved as formidable as their design indicated they might have turned the scale in Germany's favor.

However, after much cogitation it was decided not to build them, as the construction of their hulls, armor and guns would have delayed the supply of essential material for the army and navy, and also because the ships would have taken at least eighteen months to complete, by which time the Germans confidently expected the war would be over and won.—By Hector C. Bywater, *Baltimore Sun*, 25 October, 1923.

## JAPAN

Aircraft Carrier Wrecked by Quake.—Ambassador Hanihara yesterday informed the State Department, in a note, that the converted aircraft carrier *Amagi*, of the Japanese Navy, had been "so seriously damaged by the recent earthquake" it was being broken up. In the note the Ambassador said:

"Under instructions from my government I have the honor to inform you that the *Amagi*, of the imperial Japanese Navy, which was under construction at the Yokosuka naval dock yard, and was being converted into an aircraft carrier, in accordance with a provision of article 9 of the treaty concerning the limitation of naval armaments signed at Washington on February 6, 1922, has been so seriously damaged by the recent earthquake that the complete breaking up of the ship is inevitable.

"The Japanese government, therefore, have decided to replace the *Amagi* by the *Kaga*, construction of which had been stopped, but which will now be converted into an aircraft carrier with 26,000 standard displacement tons after its completion."—*Washington Post*, 8 November, 1923.

Japan Begins Scrapping Operations.—Orders have been issued by the Japanese Navy Department for the immediate commencement of scrapping operations on all ships affected by the Washington Treaty. According to an official announcement, the principal ships to be dealt with at Kure are the battleships *Tosa* (30,000 tons) and *Settsu* (21,420 tons) and the armored cruiser *Ibuki* (14,600 tons). Before being broken up the *Tosa* is to be used as a target for battle practice in Hiroshima Bay. The *Settsu* will also be used as a target after her guns and other equipment

have been taken out. The main propelling machinery of the *Ibuki* will be installed in the *Havatomo,* one of the fleet auxiliary ships now building.

In spite of strong protests by the Japanese Press, the authorities have decided to scrap the historic *Mikasa,* since to have retained her would have involved a breach of the treaty; but the bridge of this ship, from which Admiral Togo directed his fleet in the victorious action of Tsushima, is to be preserved at the Naval Museum in Tokio. As the Yokosuka Dockyard was extensively damaged in the earthquake and fire of September 1, the ships that were to have been scrapped there will be towed away to other ports. These are the battleships *Kaga* (a sister of the *Tosa*), *Aki, Satsuma,* and *Asahi.* The last-named is to be kept for non-combatant service, after the removal of her armament, while the *Aki* and *Satsuma* are to be used as targets by naval gunners and airmen. To Sasebo Dockyard have been allotted the *Kurama, Ikoma, Shikishima,* and *Hizen.* The *Shikishima* is to be retained as a hulk, but the other three will be broken up. The *Kashima* and the *Katori* will be demolished at Maizuru.

Extraordinary pains have been taken to salve the Japanese submarine *No. 70,* which foundered on her trial trip two months ago, for the naval authorities are most anxious to examine this vessel with a view to discovering the cause of the accident. Structural defects have been alleged by survivors, all of whom agree that the vessel, after emerging from her last dive, was making water rapidly. It would appear, therefore, that some part of the hull had given way under the pressure to which it was subjected during the diving trials, though the maximum depth reached is said not to have been more than 100 feet. The Kawasaki firm, which built the unfortunate boat, are no less desirous than the Navy Department of establishing the cause of the disaster.—*The Naval and Military Record,* 17 October, 1923.

Japan Makes Heavy Cut in Navy Budget.—Tokyo, November 15 (By A. P.).—Budget estimates for 1924 anticipate a reduction of 104,000,000 yen (about $52,000,000) in expenditures, as compared with the current year and a reduction of 129,000,000 yen in the Japanese government revenues, it was made known today.

Naval estimates are decreased by 40,000,000 yen under estimates before the earthquake and 1,000,000 yen below the figures submitted after the quake. War department estimates are reduced 193,000,000 yen under the pre-quake figures.

Naval estimates for 1923, originally 278,000,000 yen, have been reduced to 239,000,000 yen by postponing for one year land and water defense projects.

Estimates for the 1924 naval program are 238,000,000 yen, and includes 88,000,000 yen for auxiliary vessels, 13,000,000 yen for land and water defenses and 2,000,000 yen for naval reconstruction.—*Washington Post,* 15 November, 1923.

Budget Delay in Japan is Because Navy Wants More.—Tokio, November 13.—The date for calling a special session of the Diet has been fixed tentatively as December 10. Delay is due to inability of the cabinet to agree on budget estimates for the fiscal year and on reconstruction plans.

Minister of Finance Inouye is reported to be insistent upon keeping expenditures within 1,200,000,000 yen (approximately $600,000,000). It is understood that all departments, except that of the Navy, have accepted Inouye's figures, and the Navy's demands still are under consideration by the cabinet. Naval estimates are likely to be reduced heavily as many workmen are being discharged at the dockyards, which probably means postponement for a year or more of the auxiliary program.

Reconstruction will call for a heavy expenditure, but complete restoration of the devastated area is not likely to be realized for many years. The department of finance has refused the request of Kobe for an appropriation for the construction of a silk conditioning house at that port on the ground that the Government previously had agreed to spend its share of the profits of the Imperial Silk Company on expansion of the Yokohama silk conditioning house.

An imperial rescript enjoins the people to practice thrift and industry. The Government has proclaimed a bankruptcy act under which companies unable to discharge their obligations, in consequence of the earthquake, are protected from being declared bankrupt until the end of August, 1925.—*Boston Transcript*, 13 November, 1923.

## UNITED STATES

SALE OF NAVAL VESSELS.—Vessels to be scrapped in accordance with the Treaty Limiting Naval Armament, bids for which were submitted, have been awarded as follows:

Battleship *North Carolina*, at Norfolk, to N. Block and Company, Norfolk, Va., at their bid on "as is," "where is" basis, $42,365.

Battleships *Indiana*, and *South Dakota*, at New York, to the Steel Scrap Company, Philadelphia, at their bid on a tonnage basis, of $9.51 per gross ton, cut to shipping sizes, F. O. B. cars, estimated total for *Indiana*, $92,969.76; for *South Dakota*, $103,107.42.

Battle cruisers *United States* and *Constitution*, at Philadelphia; to Steel Scrap Company, Philadelphia, at their bid on a tonnage basis, of $13.26 per gross ton, cut to shipping sizes, F. O. B. cars; estimated total for the *United States*, $84,996.60; for the *Constitution*, $92,024.40.

*Montana* on the ways at the Navy Yard, Mare Island, Cal., awarded to Learner and Rosenthal, Oakland, Cal., for $47,110—highest bid received for that vessel in the sale of October 25.

American Iron and Metal Company, Oakland, Cal., for the *Georgia*, $58,666; for the *Rhode Island*, $47,666.

Both vessels now at the Mare Island, Navy Yard, Cal.

Walter W. Johnson, San Francisco, Cal., for the *Connecticut*, $42,750. Now at the Puget Sound Navy Yard, Washington.

The Boston Iron and Metal Company, Baltimore, Md., for the *New Hampshire*, $66,560; for the *Louisiana*, $66,560.

Both vessels now at the Philadelphia Navy Yard.

The Steel Scrap Company, Philadelphia, Pa., for the *Constellation*, as is where is, $45,666.66 on a deferred payment basis; for the *Ranger*, as is where is, $10,666.66 on a deferred payment basis; for the *Iowa*, as is where is, $55,666.66 on a deferred payment basis; for the *Massachusetts*, $12.06 per gross ton, shipping size, on a deferred payment basis.

The *Constellation*, *Ranger* and *Iowa* are at the Newport News Shipbuilding and Drydock Company, at Newport News, Va. These are to be scrapped by the purchasers. The *Massachusetts* is at the Bethlehem Shipbuilding Corporation's plant at Fore River, Mass., and the Government is to arrange for cutting this vessel to shipping sizes.

Six more vessels, battleships afloat, now at navy yards, are to be sold by the Navy on November 30. These are: The *Michigan*, *Minnesota* and *Kansas*, at Philadelphia: the *Delaware* at Boston, and the *Vermont* and *Nebraska*, at Mare Island, Cal.—Navy Department Press Bulletin.

NEW NAVAL CONSTRUCTION PROGRAM.—In signing the Naval Treaty, the United States abandoned the program of 1916. The program of 1916 was something definite to place before the people. The advocates of national defense were able to rally around it and from year to year secure

legislation increasing the strength of the American Navy. The program was authorized by an act of Congress and it was only a question of securing appropriations from year to year to carry it out. The keels were laid, or the contracts were let, for the completion of the 1916 program when the United States went into the conference for the limitation of naval armaments. The conference went just far enough to destroy the 1916 capital ship program, but it practically put no limitation on cruisers and lighter ships. All the strong features of the 1916 program that was nearing completion were wiped out by the treaty.

What is needed now is another program, one that will come within the limits of the treaty. It is stated that the General Board has made a study of a matériel program under the treaty. As a matter of fact, the Secretary of the Navy has given out extracts of it. Evidently, the recommendations for this year's new construction are part of it. The entire program has not yet been given to the public.

It is now stated that the General Board is of the opinion that a policy for personnel should be added to the program for ships. The limitation placed on construction of new ships increases the importance of a trained personnel. If the strength of the enemies' navy is to approximate that of the American Navy it will then be a trial of the strength of personnel. Men that man the ships have always been an important factor in naval warfare. Some of the great strategists have given the personnel first place. If they were to study the problem under the limitation treaty there is no doubt that they would increase the value set on personnel.—*Army and Navy Journal,* 3 November, 1923.

NAVAL PERSONNEL EFFICIENCY STUDY.—The General Board has gone far enough in its study of naval personnel efficiency and management to determine that it will be necessary to work out an entirely new policy. In searching its files it had found very little on the subject and must depend entirely upon suggestions and testimony from officers whom it will call before it from time to time.

In the past, the General Board has devoted its time entirely to matériel. This is the first time it has been called upon to study personnel matters and recommend a general policy. Members of the board are free to admit that a very complex problem is presented and one that will require considerable time.

It is generally recognized that with the changes in modes of living and thought of the people of the country there must be some progressive measures adopted by the Navy. Naturally, however, officers with long service in the Navy hesitate to disturb any established institutions of the service. The Navy has a glorious record. The conduct of its personnel in battle compares with that of any Navy in the world. Its regulations have been liberalized from time to time. but some of the most efficient commanders in the service are of the opinion that there is room for improvement.

Aside from the subject of discipline, the General Board will be called upon to make some recommendations as to what is the required strength of the "treaty Navy." In some quarters it is insisted that a treaty Navy should be clearly defined by the General Board.—*Army and Navy Journal,* 3 November, 1923.

AIRY THOUGHTS ON AERIAL MATTERS.—For some time the *American Legion Weekly* has been printing excerpts from opinions received at their hands from legislators, governors, editors, college presidents and private citizens on the feasibility of calling a conference for the limitation of aircraft programs. The idea seems to have taken well, and the large majority of those whose opinions have been quoted or cited appear to be in favor of

having the United States propose such a conference to put an end to the present race in the building of military flying ships.

There are, however, a few opposing voices. In quoting President Coolidge's judgment of the proposition, at second hand, as imagined by a Kentucky editor, the Legion is forced to admit that this may not be the time. And Congressman J. J. Rogers doubts the possibility of success, for he fears any such attempt might reach an impasse.

It is strange that there are no more dissenting voices. It really appears that the widespread approval of the plan has been hasty and thoughtless, and that it was made with short memories and short vision as to the past and as to the present.

Here we seize the opportunity to put forward our own objections, hoping, as did the judge who handed in a dissenting opinion in court on an important case, that, eventually, the stone rejected of the builders might become the headstone of the building.

These commentators refer to the Washington Limitation of Armaments Conference and its assumed success in bolstering up their opinions. They forget that that was only a temporary limitation, acceded to for ten years only and on economic grounds. They forget that the vigorous action of France prevented the matter of land limitation being included on the list of agenda: France, the most powerful nation today in military strength. They forget that the entire so-called success of the conference was due to the fact that the United States laid its cards on the table, not to win the pot, as in poker, but as an absolute discard; that the United States sacrificed a potential superiority and a building program that would have given us certain leadership.

The nation which has superiority can with good grace propose disarmament or limitation, as we did in naval matters. Such a nation can sacrifice itself for reasons of economy or for an ideal, if it wishes to. France could have done so at Washington in the matter of land forces, if she wanted to. But she did not! France could now, with her aerial superiority, sacrifice herself in the matter of air forces, if she wanted to. Who will imagine that France will? Does her attitude on armies at Washington lead to any such belief? Does her attitude on the Rhine or her activity and strength in the air at home lead to any such belief?

At Washington we found eager listeners to our proposal, because we had something to give up. At an aircraft limitation conference we would not have an aerial strength at all comparable to those of the other nations represented around the diplomatic table. We would have comparatively nothing to give up. We are inferior in the air, as military men know. We would simply be going into such a conference and asking other nations stronger than ourselves to give up their superiority so we would not suffer from our inferiority.

Mr. R. G. Landis had the matter right when he proposed that such a conference would be beneficial to the United States from the standpoint of national defense, if it resulted in taking foreign planes out of the air. He has said: "If we are going to have any wars, we will stand a lot better chance if there has been an intelligent arms limitation program than if our friends in foreign countries have been allowed to run riot and build up tremendously powerful fleets, armies and air establishments." And the nations of the world would see our request for such limitations in just that light, as a scheme for making up on treaty clauses for our present failure to maintain adequate air forces ourselves.

Our willingness to cut our program, to scrap our ships, and to make the Washington Conference a success was a worthy and a dignified thing. Our request for a conference that would cut foreign programs and junk foreign planes would be neither worthy nor dignified. We would be suppliants, with everything to gain and nothing to lose.

It is a nice thing to have your possible antagonists disarm so as to increase your comparative strength; but it is not a nice thing to ask for; and if you ask for it, you will probably meet as curt a refusal as Poincaré handed out at Washington, and make yourself the laughing stock of the world as well.

Such loose thinking and such absolute disregard of pertinent facts in connection with any such international matter shows how unsubstantial is a great deal of the thought now being disseminated throughout the country on any matter that concerns national defense. That anyone should be such a dreamer and have such airy and fantastic notions is cause enough for surprise. That such a large number of seemingly intelligent people should be willing to subscribe to those notions is astounding.

It is the absolute duty of every officer, be he aviator, Army man or Navy man, to spread the sound truth whenever he can that the United States cannot take the lead in aerial disarmament or limitation, because the United States is not in the lead, and that the United States cannot give up what the United States does not have, and that for us to ask other nations to come to us and surrender their own strength when we have nothing to offer in return is but a pretty day dream that would be shattered in a gale of international laughter.—*Army and Navy Journal*, 3 November, 1923.

SELECTION FROM NAVAL ACADEMY.—It would not be surprising if the Secretary of the Navy were to recommend very strongly to Congress the repeal of the law which at the end of this fiscal year will reduce the number of appointments to the Naval Academy from five to three per Representative and Senator. When the reasons for the repeal of this law are submitted to Congress it is believed that the recommendation will be accepted by the legislators.

The original purpose for the passage of the law was a desire to reduce the expense of maintaining the Academy. On the face of it, it would appear that there would be almost a fifty per cent decrease in the cost of maintaining the Academy. However, it has been found upon careful investigation that the reduction would be insignificant. The change will bring no reduction in the overhead cost of the institution or in any of its larger items of expense. Practically the only reduction will be that of the board of rations for the additional midshipmen.

If the law is to be repealed, the Academy will be placed on an entirely different basis. When a midshipman enters the Academy under the new policy he will not do it with the assurance that he will be commissioned in the Navy. There may be some provision in the law by which those in excess of the requirements of the Navy will be commissioned in the Reserves. Midshipmen may be given the privilege of resigning from the Regular Navy on the condition that they accept commissions in the Reserves and be liable for a call to active duty in the event of war. This plan would amount to extension of the policy of selection into the Academy.

Incidentally, this will give the Navy Department an opportunity to appoint midshipmen to all of the staff corps excepting the Medical and Chaplain Corps. Midshipmen who displayed business talents could be selected for the Supply Corps, and, in fact, all of the staff corps could be filled in this manner.—*Army and Navy Journal*, 27 October, 1923.

TECHNICAL ELEMENTS AFFECTING SEA POWER.—London, October 24.—American service journals announce that the plan of modernizing the United States battle fleet by raising the elevation of its guns, fitting additional protection against torpedo and air bomb attack and converting coal-burning ships to oil fuel forms part of the program which the Navy Department is to lay before Congress in December.

This project, it will be recalled, was originally submitted last year and so far approved that a fund of $6,500,000 was appropriated as a first installment for beginning the work. The decision of Congress was largely influenced by data furnished from the Navy Department, purporting to show that the British fleet, by lately increasing the elevation of its guns, had secured an overwhelming advantage in long-range fire.

Meanwhile, however, the British Ambassador informed the Washington Government that the Navy Department's statements relating to British gun elevation were erroneous. No British ship had had its gun mountings altered since they were installed, nor was there any intention of making such change. Further the Ambassador presented a table giving the extreme range of every main gun in the British fleet, from which it appeared that the Navy Department's estimate was exaggerated.

On receiving this communication, Mr. Secretary Hughes immediately published a retraction of the speech that he had made at New Haven some months previously, in which he had cited the Navy Department's figures as a reason for improving the gunnery equipment of the United States fleet. It was decided that the $6,500,000 should remain untouched, pending further consideration of the matter, and it looked as if the money would revert to the Treasury.

But though the Navy Department frankly acknowledged its information as to British gun elevation to have been incorrect, it was by no means prepared to shelve the modernization program on that account. When the official British statistics were examined more closely they were still found to give the British fleet a marked advantage in hitting power at all decisive ranges.

At 30,000 yards and above, the American fleet could develop a preponderance of fire, thanks to the high elevation of the main battery in the *Maryland* class and in the *California* and *Tennessee*, but at anything under that distance the British ships would have the best of it, as all of them could use their guns up to 25,000 or 26,000 yards, whereas very few American vessels could shoot farther than 23,000 yards.

Now, in any naval battle likely to be fought within the discernible future there will be little or no hitting until the opposing fleets have closed to at least 25,000 yards, because that represents about the limit of visibility under favorable atmospheric conditions. One or two hits might be scored at 30,000 yards, but they would be pure "flukes," and no admiral would choose to waste his ammunition on such blind shooting.

Of course, if both firing ship and target were stationary it would not be difficult to make hits at this range, or even beyond it, but in a modern naval action the ships firing and the ships being fired at are all traveling at about twenty-five miles an hour, so that the range and bearing change every second, and it is only by the aid of abstruse mathematical formulas, ingenious instruments and perfect organization that a reasonably accurate fire can be delivered at ranges from 20,000 to 25,000 yards.

A great deal is heard about the possibilities of aircraft "spotting," and no doubt when this has been fully developed there will be some slight increase in the range at which ships can use their guns with effect. But naval experts in all countries are substantially in agreement that the "decisive range": viz., that at which a sufficient number of projectiles can be driven home to put the enemy out of action—does not exceed fourteen miles at most, nor do they anticipate any noteworthy increase in this range within the lifetime of existing battleships.

Consequently, the ability of a few ships, such as the United States *Maryland* class and the British *Hood*, to throw their shells a distance of 30,000 yards or more counts for very little in a practical survey of battle efficiency. The chief requirement is that all units of the battle fleet shall

be able to sight their guns up to 25,000 yards, failing which they are demonstrably lacking in tactical efficiency.

It is precisely in this respect that the United States battle fleet is at a disadvantage compared with the British, and the fact undoubtedly affords a strong argument for carrying out the modernization program.

I have never believed there was any political motive behind the demand for increased gun elevation. In order to prove their case American naval officers have been compelled to draw comparisons between the fighting power of their ships and those of the British fleet, but to infer from this that they anticipate a future clash between the two navies would be palpably absurd.

Just now there is a movement on foot in England to reinforce the fleet with new cruisers and one hears frequent references to the lead which the United States has gained by building the ten *Omaha* scout cruisers of large tonnage and high speed. The British Navy, it is pointed out, has only five ships of equivalent power to "match against" these ten American vessels. But no one supposes for a moment that this phrase is employed in the literal sense.

Naval chiefs are responsible for the defense of their country at sea. It is not their business to specify any particular nation as the likeliest enemy, but once a definite standard of relative strength has been laid down by government it emphatically is their business to see that the fleet is maintained at that standard, both as to quantity and quality, and to use all constitutional means for securing that end.

In this task they are handicapped by the highly technical nature of their subject. Neither the citizen nor the average legislator can be expected to appreciate the complex details by which a ship's fighting value is assessed.

Laymen naturally reckon in terms of tons and guns, and conclude that if one ship is as big as another and has the same weight of battery there is nothing to choose between them. Only the expert can realize the fact that a difference of five degrees in gun elevation may make all the difference between efficiency and inefficiency.

American naval men have therefore good warrant for urging that the gun elevation of their battleships be increased. When this proposal was first mooted a year ago the British Admiralty, it is said, entered a protest, claiming that the Five-Power Treaty expressly forbade all such modifications of armament.

But on this particular point the wording of the treaty is too vague to admit of any hard and fast interpretation. It simply inhibits "alterations in caliber, number or general type of main armament." My own view, for what it is worth, is that a moderate increase in the elevation of the guns would not constitute an infringement of this clause, an opinion which I know to be shared by many naval authorities on this side.

Of course, should the Navy Department decide to give all its battleship guns a maximum elevation of thirty degrees, the mean extreme range would then be in favor of the United States; and although for reasons explained above this would be no very serious matter from the tactical viewpoint, the British Admiralty might nevertheless feel disposed to equalize matters by making similar alterations in their own ships.

If this were done the British fleet would probably recapture the lead in range, because its guns, being mostly of larger caliber than the American, will shoot farther at a high angle of elevation. In that case nothing would have been gained by either party to compensate for the expenditure of many millions.

If, however, the Navy Department merely desires to bring the mean extreme range of its fleet batteries up to the British level, the London Admiralty would have no valid grounds for objection.

From the general tone of the American service press it is clear that very strong feeling has been aroused by the delay in effecting this gunnery improvement. There is a tendency to credit the British Government with a selfish desire to restrict American sea power in every way possible, one service paper declaring, for instance, that the naval gun-range figures were communicated to the State Department "at a psychological moment which could not do other than influence the action of our Congress."

Probably, therefore, the cause of international amity would benefit if the Navy Department were given a free hand with its battleship-renovation scheme. Even in democratic countries service influence is a factor in molding public opinion, and that the gun controversy has led many officers and officials of the United States Navy to view Great Britain and her policies with a somewhat critical eye is not to be disputed.

As for the proposed fitting of extra bulge and anti-air protection to certain battleships, the American Government's right to undertake this work is nowhere challenged. There is, indeed, a clause in the treaty that permits such reconstruction, provided the resulting increase in displacement does not exceed 3,000 tons. The conversion of coal-burning ships to liquid fuel is not mentioned, but since the Admiralty here is engaged at this very moment in altering the battle-cruiser *Tiger* along these lines, it could hardly take exception to similar procedure in the United States.

There has never been any real substance for the more or less *sotto voce* wrangling between British and American naval experts which has gone on since the Washington Conference. Most probably it originated in a mutual feeling of irritation at the wholesale scrapping of valuable ships, Americans believing that the scepter of the seas had been snatched away just as it was within their grasp, while the British were no less sure that their country, in agreeing to accept naval parity with the United States, had made a gratuitous and foolish sacrifice to sentiment.

One may hope, however, that the last has now been heard of these barren technical polemics, which are wholly at variance with the spirit in which both nations signed the naval covenant.—By Hector C. Bywater. *Baltimore Sun*, 8 November, 1923.

## MERCHANT MARINE

AMERICAN CONFERENCE URGES OPERATION OF FLEET BE PUT IN PRIVATE HANDS.—New York, November 8.—The American Marine Conference today passed resolutions calling upon the Shipping Board and the Emergency Fleet Corporation to retire without delay from the business of operating ships and to place the operation in private hands.

Another resolution submitted to the conference by the resolutions committee, calling for abolition of the Shipping Board and transfer of its functions and duties to the Department of Commerce, met with considerable opposition and after a lengthy discussion was tabled.

Other resolutions passed by the conference called for:

Immediate scrapping by the Shipping Board of all vessels of inferior design and construction; selling of remaining vessels to American citizens without discrimination; scrapping of the vessels not sold under this plan, and delegation to private hands for operation until either sold or proved impracticable of all those freight and passenger lines which might be considered essential to national interests.

A proposal which called upon American citizens to use American ships whenever possible when going abroad was tabled. A proposed resolution calling upon Congress to take action against ratification of the proposed twelve-mile limit treaty with Great Britain was referred to committee.

The first session of the Marine Conference was opened with the read-

ing of a letter from President Coolidge to Colonel Edward A. Simmons, chairman of the central committee, expressing hope that a definite sentiment on the Government's shipping policy might be determined upon by the nation.

Only by the development of an American-owned merchant marine can commercial interests of the United States be protected and the export of the country's agricultural surplus be assured, Secretary Hoover, of the Commerce Department, declared today in an address before the congress. Advocating that an objective of procuring carriage of fifty per cent of American exports in American bottoms be set for national policy, he asserted that details of international trade needed consideration in the endeavor.

The remedy for the removal of an initial obstacle to use of American shipping, Mr. Hoover continued, lies in the encouragement of the establishment abroad of American agents. In this endeavor the Government could aid substantially by removing the income-tax burden on United States nationals abroad.—*Baltimore Sun*, 9 November, 1923.

Board to Seek Authority for Diesel Conversion.—In a paper read by a substitute before last week's noon-hour meeting of the Propeller Club, Rear Admiral Benson stated that the Shipping Board has 361 idle vessels with defective machinery, which it is offering for sale at a nominal sum for conversion from steam to Diesel engines. Of these ships 262 are equipped with geared turbines and water tube boilers, fourteen with turbines and Scotch boilers and eighty-five with reciprocating engines and water-tube boilers.

Continuing, Admiral Benson said that, as the retention of the advantages already gained in overseas commerce depended on the rapidity with which the internal combustion engine was adopted for marine propulsion, he intended to work for the following constructive measures:

"First, the extension of the benefits of Section 11 of the Merchant Marine Act of 1920 to the conversion of American flag steamers of the best and most efficient type into reliable and economical motorships.

"Should Congress approve such modification, the Board can then loan two-thirds of the conversion cost at a reasonable rate of interest, with payments extending over a period of years, thereby greatly facilitating the financing of conversion projects.

"Second, the adoption of a suitable policy of standardization for the ultimate object of reducing production costs of Diesel machinery and auxiliaries. Considerable study has already been given to this subject and further progress is anticipated with the co-operation of the builders.

"Third, the conversion of a number of the Board's own steamers to serve the long distance routes, for the twofold purpose of reducing cost of operation and give impetus to domestic Diesel construction."

Admiral Benson also submitted comparisons of the operating results of the motorship *William Penn* and the steamship *Ethan Allen*, sister ships, under approximately similar circumstances. The most important feature was that the *William Penn* makes on a ton of fuel two and three-quarters the distance logged by the *Ethan Allen*, which is equipped with triple expansion engines, with further savings in water, engine room, wages and subsistence, and indirect advantages such as greater cargo capacity and flexibility of operation. He said conversion of the idle ships would give American shipowners a distinct advantage over most foreign owners.—*The Nautical Gazette*, 3 November, 1923.

Diesel Electric Motorship "La Playa."—The trial trip of the United Fruit Company's new Diesel electric motorship *La Playa* took

place on October 13. She has been built by Cammell Laird & Company, and is the first of three sister ships. The other two vessels have been named *La Marca* and *La Perla*. Their dimensions are 325 x 48 x 32 feet and their designed speed is 14 knots.

The *La Playa* has been built specially for the carriage of bananas in tropical zones, and all her holds are insulated with cork and cooled on the cold air system. She has a poop, bridge, and forecastle, a cruiser stern, a straight stem, two pole masts and a single funnel. Her double bottom, which extends all fore and aft, is arranged for oil fuel and water ballast.

In view of the very successful performance of the turbo-electric driven ship *San Benito* built for the United Fruit Company about two years ago, the owners decided to install the electric drive in these new vessels also, but to substitute the Diesel engine for the steam turbine. The adoption of this type of machinery has great advantages from the shipowner's point of view, not only on account of the low consumption of fuel, but also because of the largely increased capacity for cargo which can be obtained in comparison with other vessels of the same class with steam machinery.

The increased bin capacity of this vessel over a vessel of the same size and fitted with reciprocating steam machinery is twenty-six and three tenths per cent, and the increased bin capacity over the same vessel fitted with turbo-electric machinery is twenty-nine per cent. The fuel oil consumption on the vessel with triple expansion engines and the vessel with turbo-electric machinery, excluding refrigerating machinery, was thirty-one to thirty-two tons per twenty-four hours, whereas in the case of *La Playa* fitted with Diesel-electric machinery the oil fuel consumption for similar power is thirteen and one-half tons.

The machinery consists of four generating sets arranged in an engine room amidships which, in effect, forms a power station. Each unit consists of a four-cylinder Camellaird-Fullagar Diesel engine developing 825 b.h.p. at 250 r.p.m. and directly coupled to a 500 k. w. generator supplying continuous current for propulsion purposes at 220 volts. Each engine also drives an auxiliary generator of 200 k.w. at 220 volts arranged in tandem with the main generator. These auxiliary generators supply power for the ship's auxiliaries, the refrigeration plant and also for the excitation of the main generators and the propelling motors. The main generators are electrically coupled in series, and although all four are in operation at full power, three, two, or only one set may be used at reduced powers if desired, the combined voltages being 880, 660, 440 or 220 according to the number of sets on the propelling circuits.

The engines have cylinders 14-inch diameter, a 16-inch stroke with opposed pistons and follow the usual Cammellaird-Fullagar two-cycle design as developed for power station work. The engines are entirely enclosed, and as they have no reversing gear and the fuel valves are driven direct from cams mounted on the crank shaft, there is a remarkable absence of external gear.

The adoption of four generating units results in a remarkably compact machinery arrangement with, as has been stated, a consequent substantial increase in fruit carrying capacity. In addition, this subdivision insures very economical operation at reduced powers as the consumption of fuel oil per s.h.p. varies little whether one, two, three, or four generating sets are working. This feature is of special advantage in the service for which these vessels are intended, as, when proceeding south to the West Indies in light condition, only two or three engines will be necessary, whereas, when returning north, fruit-laden and with the refrigerating plant in operation, all the four sets will be required. A further advantage of this arrangement is the security obtained against total breakdown—so essential where a perishable cargo is concerned—for with only two of the four units in operation, a speed of about 10½ knots can be maintained.

The main propelling twin motor is installed in a separate motor room right aft in the ship, thereby eliminating the usual shaft tunnel and resulting in clear after hold for the carriage of fruit. As the propeller motor consists virtually of two motors in series, it is possible to develop power for about three-quarters speed with only one-half of the motor available should a breakdown occur to the other half.—*The Nautical Gazette*, 3 November, 1923.

## ENGINEERING

MERCURY ENGINE SAVES FORTY PER CENT OF FUEL.—First One in World for Production of Commercial Power in Operation in Hartford.—Boilers are Very Intricate.—Mercury Can Be Used Over and Over—Vapor Operates a Turbine Engine.—Special to the *Transcript:* Hartford, Conn., October 23.—The first mercury engine in the world for the production of power in commercial quantity is now in operation in the plant of the Hartford Electric Light Company whose officials predict a saving of from forty to fifty per cent of fuel by its use. The invention is essentially a turbine engine run by mercury vapor. The whole electrical industry is interested in observations being made of its operation.

Incentive for a careful investigation of the properties of mercury vapor for power generation is given by the high cost of coal and its transportation, making it necessary to minimize fuel consumption. The mercury boiler was started up successfully here early in September and has since been in regular operation, carrying a part of the commercial load of the local lighting system. Officers of the local lighting company say that it has carried approximately 3,500 K. W. of the Hartford load.

While the present installation is not of sufficient size to have any effect on total cost of power produced by the company at the present time, it is large enough to provide a working basis to figure the results that may be obtained eventually from larger sizes. The manufacture of these boilers is so intricate that it will be several years probably before the larger boilers can be in operation.

It is expected that the mercury boilers will be a very material improvement over the most modern stations, even those contemplating using 1,000 and 1,200 pounds of steam pressure. The new process will require only about one quarter of the fuel that is used with the best reciprocating engines.

The mercury vapor exhausted by the mercury turbine is sent to a condenser where it is cooled by water, just as in any ordinary power system. But the mercury vapor is so hot that the "cooling water" is turned into high-pressure steam. This steam is not wasted but is sent to a steam turbine from which additional power is obtained. This still further increases the efficiency of the system.

It is the object in making much installations in the future to replace the steam boilers in the large modern plants by a mercury boiler which will give nearly double the output in the same space. Consequently it will not be necessary for a general redesign of a station to obtain the benefit of better economy.

The process was invented and designed by Dr. W. L. R. Emmet. As the characteristics of mercury vapor had never been thoroughly studied by other scientists, it was necessary for him to go into this general subject in great detail. It was found that no form of packing of the joints would resist the mercury vapor and a system of arc and acetylene welded joints was therefore developed.

In this connection it is of interest to recall that the Hartford Electric Light Company installed the first commercial size steam turbine in this country.

The possible efficiency of the mercury vapor process for the generation of electrical power is equivalent to that of internal combustion engines, its inventor, consulting engineer of the General Electric Company, said in a statement. Since the new process involves only simple rotation and is applicable to any kind of fuel, Mr. Emmet expects it to be "simple and practicable for application to a variety of purposes" just as soon as the commercial installation at Hartford is given a severe service trial and mechanical difficulties are fully overcome.

The mercury boiler and turbine is not yet ready for general commercial application, Mr. Emmet said, as the development of such a process involves a very large amount of experimentation and accumulation of experience, both in methods of construction and the proportioning of boilers and condensers.

In discussing its efficiency, Mr. Emmet said:

"The possible rate of gain which may be accomplished by proposed mercury vapor process, as compared with steam plants, is naturally dependent upon the conditions and efficiency of the plant with which comparison is made. To give an idea of the possibilities it may be said that, if we compare with a steam turbine generating plant, using 200 pounds steam pressure, with the highest standards of efficiency in turbines and auxiliaries, the mercury steam combination with thirty-five pounds gauge pressure in mercury vapor should give about fifty-two per cent more output in electricity per pound of fuel. And, if in such a plant the boiler room is re-equipped with furnaces and mercury apparatus arranged to burn eighteen per cent more fuel, the station capacity with the same steam turbines, condensers, auxiliaries, water circulation, etc., would be increased about eighty per cent. As compared with higher steam pressures, such as are now being developed, the percentage of gain would naturally be less, but still very important."

The mercury is re-used many times, unlike the water used in steam boilers. Mr. Emmet expects that less than five pounds of mercury per kilowatt of capacity will be required when the process is operated on a large scale.—*Boston Transcript*, 23 October, 1923.

Army Engineers Test New Pontoon.—A new type of pontoon bridge made from the fiber of the silk cotton tree, or kapok tree, has recently been given rigid tests by the second engineers at Fort Sam Houston, and it is believed that the new bridge is in every way superior to the Lampert bridge, the type that is now used in the Army. It will now be only a matter of time, in the opinion of engineer officers, until the Lampert-type bridge will be replaced by that made from the fiber of the kapok tree. This tree is a product of Java. The chief of the corps of engineers recently sent eleven sections of the new bridge to the second engineers for experimental purposes. Having a whole division at Fort Sam Houston, it was very easy to test the bridge out under virtually war-time conditions. The bridge is a series of floating rafts, each section weighing 225 pounds; is twelve feet long, three and one-half feet wide, and about seven inches thick. Each raft is nothing more than a mattress of fiber from the kapok tree and is inclosed in a wooden frame, which forms a bridge floor. It is not necessary to lay a cable across a stream in order to set up the bridge. One raft is pushed out into the water and another joined to it, which is in turn pushed into the stream. The kapok fiber is one of the most buoyant substances known, having a greater buoyancy even than cork. The tests of the new bridge were conducted by Major J. N. Hodges and Captain C. R. Moore, of the second engineers, and Sergeant George Clement, Company C, of the same regiment. The engineer officers recommended several alterations for the bridge, which it is believed will make it the best pontoon yet developed.

The Lampert bridge which is now in use consists of a series of platforms supported by folding canvas boats. The boats can easily be riddled with rifle bullets when put up under fire, while the kapok bridge cannot possibly sink. The fact that it is immune to rifle fire is one of its chief assets. Other features of the new bridge are that it can be put up in half the time that it takes to construct the Lampert bridge, and fewer men are required to do the work. Engineers at Fort Sam Houston consider the new bridge as one of the greatest developments in their line of the service in many years, and much credit is due to those officers in the second engineers who conducted the experiments with it and recommended certain changes.—*Army and Navy Register,* 20 October, 1923.

## AERONAUTICS

RIDICULES NAVAL AIR ENTHUSIASTS.—Special to the *Transcript:* Newport, R. I., November 5.—Distinguished aviation enthusiasts are jeopardizing the national defense by theories that shake the faith of the country in its Navy, according to Captain Harris Laning, U. S. N., in a statement to the *Transcript* ridiculing the contention that airplanes can dominate the sea in time of war. They are also misleading the public with regard to the essentials of defense. These essentials include surface craft and especially battleships. Airplanes are not able to cope with battleships, and even find it difficult to sink them when they are given every opportunity in time of peace and fair weather, says Captain Laning, whose opinion carries much weight in the service. Captain Laning takes up an article by a famous retired naval officer printed within the last few months in the New York *Times.*

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"Our coast defense has nothing to do with the defense of the other rights claimed by us far from our shores and which are the only things that will ever bring us to war. Let us get away from the radicals' naval war as it won't be, and turn to what it will be if it comes to us. In other words let us look into the part airplanes play in the deep sea warfare that determines the 'control of the sea.'

"As long as the Treaty Limiting Armaments remains in effect as it now stands the countries signing it will have to depend for their sea power on the things permitted by that treaty. What those things are may be determined from the following rules established by the treaty.

"*First.* No vessel of war exceeding 10,000 tons standard displacement, other than a capital ship or aircraft carrier, may be acquired by, or constructed by, for, or within the jurisdiction of any of the contracting Powers.

"*Second.* No vessel of war of any of the contracting Powers, hereafter laid down, other than a capital ship, may have a gun with caliber in excess of eight inches.

"*Third.* When the present capital ships are replaced the contracting Powers are limited to the following capital ship tonnage:

"The United States and Great Britain to 525,000 tons each.

"Japan to 315,000 tons.

"France and Italy to 175,000 tons each.

"*Fourth.* No new capital ship may exceed 35,000 tons displacement.

"*Fifth.* No capital ship may carry a gun exceeding a caliber of sixteen inches.

"*Sixth.* The total tonnage for aircraft carriers may not exceed:

"For the United States and Great Britain, 135,000 tons.

"For Japan, 81,000 tons.

*Seventh.* Except for two which may have 33,000 tons displacement, aircraft carriers are limited to 27,000 tons displacement.

"*Eight.* No aircraft carrier may carry a gun exceeding eight inches' in caliber."

"From the above we see that for anything except work within the range of shore bases, which is not where sea power is usually exerted, the air forces a Navy can have are restricted (1), to what can be encompassed in the limited amount of tonnage allowed for aircraft carriers by the treaty; (2) to what can be placed on ships of other than the carrier type, and (3) what may be placed in specially built ships of less than 10,000 tons displacement. For the present, at least, there are just two variables that enter into the amount of air power a country can project into the sea area: One lies in the aircraft we can put on ships built for other purposes, such as battleships, cruisers, destroyers, submarines and auxiliaries in the fleet and train; the other in the aircraft that can be carried by specially designed ships of not over ten thousand tons displacement. Of these two variables the former does not admit of much latitude. Because it can carry only two or three small planes that can be shot off with catapults, which planes cannot carry heavy bombs or torpedoes, the ordinary ship cannot do much toward adding to the air hitting power of forces afloat. Hence the only real variable through which a country can add to its air hitting power on the deep sea lies in the ten thousand-ton ships that any country may build and ad lib. This being the case, the radicals, of course, choose that type to complete the extinction of the battleship no matter where it may be found. Let us see how the *Times* radical did it and ascertain if in presenting the case he did not still further lead his readers astray."

"This phase of the argument is started with the assumption that Japan's next dozen 10,000 'cruisers' turn out to be 35-knot 'carriers,' each carrying 'fifty planes,' which from later argument prove to be 'bombers.' These 'carriers' are moved to Hawaii, where, always protected by their own tremendous speed, they promptly bomb and destroy both the island defenses and our entire fleet. To permit this only 'a few' planes are allowed to the shore defenses and none at all to the fleet, except what can be carried by the *Langley* (which is not a carrier, but merely a tender with a flying-off deck), although our Navy is not only building the two very large carriers permitted us by the treaty, but is also equipping all types of ships with combat planes. Even assuming that Japan had the 'dozen' 10,000-ton carriers, and that each could carry fifty bombing planes, the argument is ridiculous in the face of the modern fleet's defense against air attack. But even so, let us look into these truly remarkable cruiser-carriers the radicals have developed to make good their argument even though ignoring all air defense by the fleet.

"All 10,000-ton ships that can make thirty-five knots must be built on approximately the same lines. Also in the space they give to machinery and in the guns and multitudinous equipment any war vessel must carry no other 10,000-ton naval ship can differ greatly from the cruiser of the same size. Without considering the air equipment and personnel at all, the 10,000-ton, thirty-five knot naval ship, be it cruiser or carrier, must have the same general equipment. But the carrier must cramp it all below a flying off deck, and in addition must provide (1) stowage space for fifty huge assembled bombing planes, (2) quarters for at least 100 men to fly the planes and goodness knows how many mechanics to keep them in repair, (3) must have shops for the repair of planes, gear to handle the planes to get them from their stowage to their flying off positions, huge magazines for the unlimited number of bombs and torpedoes they are supposed to drop, and (4) many other things too numerous to mention. How the radicals propose to get all these things in their 10,000-ton carriers is not clear since ship designers have trouble in getting even an unarmored cruiser's personnel and equipment in the allowed displacement.

"But perhaps the weakest point in the radicals' fantastic dream comes from the fact that we are not sure a 10,000-ton 35-knot ship can carry and launch even one of the huge bombing or torpedo planes. First of all the spread or beam of such a plane is as great or greater than can be the beam of a 35-knot, 10,000-ton ship. Just to stow one such plane on a ship of that size and speed and be able to get it up on deck and in position to launch will not be easy. It is doubtful if once on deck a heavy plane could successfully be launched with its full load. When it come to carrying and launching fifty such planes, or a like number of any other type of plane, such a ship simply cannot do it. Still the radicals deftly do it on paper, and by their subtle if questionable arguments lead our public to entirely false beliefs. In face of all that has gone before, do you believe for a minute that the visionary 10,000-ton 35-knot 'carriers' will drive the battleship from the fleet?

"Let no one get the idea from this that the conservatives believe aircraft have no place on the seas. They have a place, a place of vital importance—probably more important than that of any single type of craft yet developed. Through them the whole scheme of getting, holding and controlling overseas lines has been changed. Possibly some development of the future may so change matters that air power will also include sea power. But it will not include it on the present development of aircraft, nor will it ever do so as long as the present treaty limiting armaments remains in effect. As long as that treaty lasts air forces must remain merely one adjunct of sea power; they cannot dominate it. What air power may be after the treaty goes we cannot predict, but there must be a great advance in air development before it even then drives out the combatant surface ship. Those who devote the greatest attention to air problems often find that while air power is a factor in sea power, air power is likewise dependent upon sea power in operations over the sea. Those students believe the two powers interlock, and that each is a part of the other. Understanding the question infinitely better than the radicals, they are endeavoring to keep the national defense on a solid foundation and not change it to meet the dictates of 'flighty' imaginations.

"If the air radical is wrong and if, as the conservative holds, aircraft do play a vital part in naval warfare, what then is that part? The so-called conservatives have found by test that airplanes, within the limits of their radius of operation, can do the following:

"*First.* Gain and keep touch with practically all types of naval craft reporting (by radio) their strength, dispositions and movements. This includes such things as:

"1.—Scouting for the enemy and protectively screening one's own forces against surprise attacks from under the surface, on the surface, or above the surface. And

"2.—The detection of submarines and torpedoes.

"*Second.* Spot the fall of shots fired by heavy ships, thereby greatly increasing a ship's effective gun range and accuracy in hitting.

"*Third.* Attack enemy ships with torpedoes or bombs at favorable opportunities, but more especially when such ships are so engaged otherwise that their air defensive power is weakened.

"*Fourth.* Lay smoke screens. And

"*Fifth.* Engage other aircraft.

### Utilizing the Air

Based on the above, which are the established capabilities of airplanes, the "conservative active officers of the Navy are preparing the Navy's air plans. While not admitting that planes can destroy everything, even the conservative wants to utilize the airplane's every possibility that our

country may surely win the war should one be forced on us. Noting the capabilities of airplanes as listed above it can be seen readily that when properly incorporated in the fleet airplanes will have an influence that can be felt from the very beginning of a naval campaign, but that will particularly be felt in the battles between seagoing fleets, which battles, not attacks on coasts, give control of the sea and are therefore the decisive points of a naval war.

"Since battles are the decisive points of a war what the conservative wants is to make the greatest possible use of airplanes to win them. He knows that by the information aircraft can gain before and during sea battles they offer a means by which all types in a fleet may gain decisive advantages. He knows that by spotting for gun-fire they may bring a decisive advantage in that fire. Although air attacks with bombs and torpedoes are not overwhelmingly powerful unless supported by attacks with other weapons, he knows such direct attacks can be more successfully made against engaged ships than against those not engaged and therefore that though one cannot hope to completely destroy even an engaged enemy fleet with the weapons of the air one can hope to do sufficient damage to it to enable other weapons on other craft to destroy it. He also knows that smoke screens made by aircraft often can be better and more quickly placed than those by destroyers and may be even more efficacious. Knowing these things the conservative tries to use them all to win. If the radical had his way we could use but one of the things planes can do, and that one the one most difficult for them.

"Great as can be the influence of aircraft on the trend of a naval battle, it is evident that to get the maximum destructive effect of all the weapons of a fleet, including those carried by aircraft, the aircraft effort must be closely co-ordinated with those of the other types of craft in the battle. Only by successful 'direct attacks' with bombs and torpedoes can aircraft by themselves accomplish anything. Though such attacks may sink enough ships of one side to give the ships on the other a decisive advantage, they usually cannot be made in sufficient strength to gain as much for their fleet as do those other air efforts in which the influence on the battle is indirect, as for instance, information work, spotting, or laying smoke screens. It is in such things rather than in the direct attack that the conservative sees the great power of airplanes. Since tests in miniature and actual results of practice at sea support the conservative view and do not in the least support the 'dream' of the radical, you can easily choose the one to accept."

"The Navy Department, acting on their full information of the subject, which information is not to the hand of the radical, is bending every energy to carry out the tested and proved 'conservative' viewpoint. It is doing its best to keep in condition all the types of ships we now have, increasing their numbers where and as they can, bringing them up to the minute in offense and defense, and manning them and training them to fight. It is putting aircraft of the proper kinds and as many as possible on every surface ship belonging to the Navy. It is building two of the five large aircraft carriers allowed us under the Treaty Limiting Armaments and is prepared to build the other three just as soon as Congress appropriates the money. It is making great effort to augment the Navy with 10,000-ton 35-knot cruisers. It will ask for 10,000-ton, 35-knot carriers just as soon as it can be determined that efficient carriers of that speed can be built on that displacement. It is begging for 'fixed base' air defenses for the Canal, for our naval bases, and for our great ports, navy yards, and other vital positions, which air defenses are approved by the radical in his one really sound recommendation. These are the things and the only things that the air development of the day warrants—and, air

radicals to the contrary notwithstanding, these are the things the 'conservative' Navy is doing its best to obtain."—By W. A. Macdonald, *Boston Transcript*, 7 November, 1923.

BUYS ZEPPELIN RIGHTS.—Akron, Ohio, November 2.—All patents and rights to manufacture Zeppelin dirigibles have been purchased by the Goodyear Tire and Rubber Company, it is officially announced by this company. The deal includes the right of manufacture on all engines, machinery and auxiliaries of this type of dirigibles.

The purchase price was not announced but it was declared to be one of the highest in the history of international aviation. The giant air liners will be manufactured at the Wingfoot Lake aviation field near here, and at the Goodyear factories in this city, making Akron the center of the world's lighter-than-air craft manufacture.

Plans completed by the German aerial navigators for the establishment of a two and one-half day trans-Atlantic air service will be organized as soon as the manufacture gets under way. Surveys also have been made for the establishment of a twelve-hour New York to Chicago air service.

Negotiations for the purchase have been under way for some time, Goodyear officials said. They will be laid before the authorities at Washington in a few days, after which the details will be made public.

Experienced Zeppelin designers and builders will be brought here from Friedrichshaven, where the first Zeppelin was built, about twenty-five years ago. These plants have been virtually inactive since the Armistice. Under the peace treaty, they must be razed after the *ZR-3*, now under construction there for the United States Government, is completed.

The German engineers have evolved five types of Zeppelins, which may be regarded as standard, capable of carrying great loads of freight, fuel necessary for long distance flights, complete crews and from thirty to one hundred passengers at the rate of sixty to eighty-seven and five tenths miles an hour. Plans also have been perfected for airships for scouting, patrol work, and mine spotting in war times.—*Boston Transcript*, 3 November, 1923.

SPEED RECORD IS BROKEN BY NAVY AVIATOR.—New York, November 2 (Special).—Traveling faster than man ever did before, Lieutenant Harold J. Brow, of the Navy, today became world's champion speed aviator.

In official tests over Mitchel Field he drove at the rate of 259.15 miles an hour in the small blue Curtiss airplane in which he finished second in the Pulitzer trophy race in St. Louis last month.

In one stretch he made 265.21 miles an hour, a rate that would carry one from New York to Washington, 228 miles, in fifty-one minutes.

Lieutenant Brow also turned the tables on Lieutenant Alfred J. Williams, also of the Navy, who won the Pulitzer trophy contest. Lieutenant Williams, in the other of the twin racers, bettered his own mark of 243.67 miles, or more than four miles a minute, by attaining a speed of 258.61 miles an hour.

The flights were made under the accepted international speed rule, which calls for going over a three-kilometer course and back twice, the average time being taken. They were held under the jurisdiction of the National Aeronautical Association, and Lieutenant Brow's speed, therefore, stands as a mark for all other nations to shoot at.

The straightaway course, with time at the turns not counted, made possible greater speed than in the triangular race for the Pulitzer trophy, but even the most rabid aviation enthusiasts were thrilled by the daring of the two airmen, who swept like moulten stars rimmed with flame low across the sward and then swooped up and down like some winged prehistoric monsters snorting vapor from their nostrils.

A handful of spectators who had been waiting since this morning for the promised trial was rewarded. The aviators did not wait to take advantage of static air, but for the wind that had been blowing diagonally across the field, and rolled the air, to flatten somewhat.

The high noon sun did that and at 1:30 P. M. Lieutenant Brow had the 650-horsepower motor in his racer started. The sky was cloudless.

In a few minutes the motor was warmed up and Brow was off. Over the turf he taxied at seventy-five miles and then shot up without a spiral until the machine and he were only a flake against the blue.

The course was between two pylons. Under the second squatted the official scorers with electrical communications to the watchers at the other end.

Presently from nowhere came a speck. It was Brow, with a streak of black smoke trailing behind him. It looked like a long-haired member of the solar system approaching the earth.

Suddenly he dove for the pylon. The rule is the course must be covered at no greater height than 164 feet. He seemed to dive like a rock, but at 160 feet he straightened out and shot like a bullet over the three kilometers. He was going so fast only a burst of noise was heard instead of a roar of an airplane motor. Although just overhead of those on the field, all they could see was a flare of flame and a streak of blue behind it. The smoke tail was way in the van.

At the other pylon Brow shot the speed demon upward again and circled about. Then he deftly dove again and shot back over the course. This performance he went through twice and then came down to learn that he had averaged 257.42 miles an hour, which was 13.75 miles faster than Lieutenant Williams had made in St. Louis.

He said he could do better and instructed the mechanics to get the motor to hit evenly, announcing that he might try again.

Then Williams, who weighs more than 200 pounds (fifty more than Brow), set forth. By this time the still air had been stirred a bit by a six-knot southwest breeze, but it blew across the course. Williams had learned that his record had gone a glimmering and was after another one. He defied wind and all to attain it. His motor was running perfectly and he took the air like a skyrocket. Over the course and back he flew twice for a mark of 258.61 miles an hour, bettering Brow's mark.

Then Brow started off for the second time. He attained a speed of 265.21 miles. His average was 259.15 miles, or 15.48 miles better than Williams' St. Louis record.

"I am going to beat your record tomorrow," Williams told Brow as he congratulated him.

The aviators attributed their speed largely to the camber wings of the planes, which are convex on both sides, and offer almost no wind resistance. Then the craft weighs only 2,100 pounds.—*Baltimore Sun*, 3 November, 1923.

AWARDS FIFTEEN RECORDS TO NAVY SEAPLANES.—Washington, November 3.—The Federation *Aeronautique Internationale* of Paris, which has the last word respecting internationl records, has officially established as world marks for seaplanes fifteen figures set by American naval fliers at San Diego, Cal.

In announcing the receipt of this information the National Aeronautic Association stated that "notwithstanding the announced intention of the French to win back world flying records captured by United States fliers from Europeans during the last two years and the setting up of large purses to reward any French flier who succeeded in capturing American world records, the 1923 air racing season is drawing to a close with but one such capture to record."

This is offset, it is asserted, by the fact that during the 1923 season thirty-three additional world flying records are now held in the United States. The fact was also emphasized that in the Jacques Schneider international seaplane races American competitors broke all existing records for distances under 300 miles, although their performances could not be credited as official world records because they were not flown over the recognized official distances.

"America's supremacy in the airplane field is complete," said an official of the National Aeronautic Association, who asserted that out of forty-two recognized world's records for airplanes and seaplanes American fliers hold thirty-three, French three, English four, Italian one and Spanish one.

It is understood that Lieutenant Macready of the American Army Air Service, who held the altitude record just broken by Sadi-Lecointe of France by a margin of 732 feet, will soon make an attempt to break the Frenchman's record.

The complete list of world air records recognized by the Federation *Aeronautique Internationale* as made public by the National Aeronautic Association follows:

Maximum speed—236.587 miles per hour, Curtis Racer, biplane; Lieutenant R. L. Maughan, United States Army, March 29, 1923.

Duration—37 hours 5 minutes 43.8 seconds, *D.H.-4* biplane (refueled in flight); Lieutenants Howell H. Smith and J. P. Richter, United States Army, August 27-28, 1923.

Distance—(3,293.26 miles) 5,300 km., *D.H.-4* biplane (refueled in flight); Lieutenants Lowell H. Smith and J. P. Richter, August 27-28, 1923.

Altitude—35,329 feet, Nieuport-Delage, 300 hispano; Sadi-Lecointe, French Ville Sauvage, France, September 5, 1923.

Speed Records For Given Distances

100 kilometers, 62.14 miles, 243.81 miles per hour, Curtis Navy *R 201*, Ensign A. J. Williams, United States Navy, October 6, 1923, St. Louis.

200 kilometers, 124.27 miles, 243.67 miles per hour, Curtis Navy *R 210*, Ensign A. J. Williams, October 6, 1923, St. Louis.

500 kilometers, 310.69 miles, 167.8 miles per hour, Verville Sperry *R 3*, Lieutenant Alexander Pearson, United States Army, March 31, 1923, Dayton.

1,000 kilometers, 621.87 miles, 127.12 miles per hour, *DH-4* biplane, Lieutenant H. R. Harris and H. Lockwood, United States Army, March 31, 1923, Dayton.

1,500 kilometers, 932.05 miles, 114.35 miles per hour, *DH-4* biplane, Lieutenant H. R. Harris, April 17, 1923, Dayton.

2,000 kilometers, 1,342.74 miles, 114.22 miles per hour, *DH-4* biplane, Lieutenant H. R. Harris, Dayton.

2,500 kilometers, 1,443.42 miles, 88.72 miles per hour, *DH-4* biplane, Lieutenants Lowell H. Smith and J. P. Richter, August 27-28, 1923, San Diego (refueled in flight).

3,000 kilometers, 1,861.11 miles, 88.15 miles per hour, *DH-4* biplane, Lieutenants Lowell H. Smith and J. P. Richter, August 27-28, 1923, San Diego (refueled in flight).

3,500 kilometers, 2,174.79 miles, 88.34 miles per hour, *DH-4* biplane, Lieutenants Lowell H. Smith and J. P. Richter, August 27-28, 1923, San Diego (refueled in flight).

4,000 kilometers, 2,485.48 miles, 88.23 miles per hour, *DH-4* biplane, Lieutenants Lowell H. Smith and J. P. Richter, August 27-28, 1923, San Diego (refueled in flight).

4,500 kilometers, 2,796.16 miles, 88.45 miles per hour, *DH-4* biplane, Lieutenants Lowell H. Smith and J. P. Richter, August 27-28, 1923, San Diego (refueled in flight).

5,000 kilometers, 3,106.85 miles, 88.55 miles per hour, *DH-4* biplane, Lieutenants Lowell H. Smith and J. P. Richter, August 27-28, 1923, San Diego (refueled in flight).

Records with 250 kg. (552.5 pounds) useful load, altitude 24,074 feet, Bleriot, Jean Casale (France), March 20, 1923, at Buc.

Records with 500 kg. (1,105 pounds) useful load, altitude 19,660 feet, Captain Thierry, Breguet Sesquiplane (Spain), March 12, 1923, at Cuatro Vientos.

Records with 1,000 kg. (2,210 pounds) useful load, altitude 16,372 feet, Bleriot, Jean Casale (France), June 1, 1923, at Buc.

Records with 1,500 kg. (3,315 pounds) useful load, duration 1 hour 20 minutes, Captain C. T. R. Hill, Handley-Page *W-8* (Great Britain), at Cricklewood; altitude 14,000 feet, Captain C. T. R. Hill, Handley-Page *W-8* (Great Britain), at Cricklewood.

### Official World Seaplane Records

Maximum—174.07 miles per hour, Alexander Parsaleva, Savoia Seaplane, H. S. 300 h.p. (Italy), December 28, 1922, at Milan; duration, 11 hours, 16 minutes, 50 seconds, Lieutenant M. A. Schur, United States Navy, Davis Douglas seaplane, Liberty 400 h.p. motor, June 12, 1923, at San Diego; distance, 792.25 miles, Lieutenant M. A. Schur, Davis Douglas seaplane, Liberty 400 h.p. motor, June 12, 1923, at San Diego.

Altitude—13,898 feet, Lieutenant C. F. Harper, United States Navy, Davis Douglas seaplane, Liberty 400 h.p. motor, June 7, 1923, at San Diego, Cal.

Speed Records for Given Distances (100 km.)—62.14 miles, 129.75 miles per hour, Captain Biard (Italy), Supermarine, Napier Lion, 450 h.p. motor, August 12, 1922, at Naples; 200 km., 124.27 miles, 129.39 miles per hour, Captain Biard (Italy), Supermarine, Napier Lion, 450 h.p. motor, August 12, 1922, at Naples; 500 km., 310.69 miles, 72 miles per hour, Lieutenant M. A. Schur, United States Navy, Davis Douglas seaplane, Liberty, 400 h.p. motor, June 6, 1923, at San Diego, Cal.

1,000 km., 621.37 miles, 70.49 miles per hour, Lieutenant M. A. Schur, Davis Douglas seaplane, Liberty 400 h.p. motor, June 6, 1923, at San Diego, Cal.

Record with 250 kg. (522.5 lbs.), useful load—Duration, 10 hours, 23 minutes, 58 seconds, Lieutenant H. T. Stanley, United States Army, *F.-5-L.* Flying boat, 2 Liberty 400 h.p. motor, June 6, 1923, at San Diego; distance, 574.75 miles, Lieutenant H. T. Stanley, United States Army, *F.-5-L.* Flying boat, 2 Liberty 400 h.p. motors, June 6, 1923, at San Diego; altitude, 10,850 feet, Lieutenant E. B. Brix, United States Navy, Davis Douglas seaplane, Liberty 400 h.p. motor, June 7, 1923, at San Diego.

Records with 1,500 kg. (3,315 pounds) duration, 7 hours, 35 minutes, 54 seconds, Lieutenant H. E. Halland, United States Navy, *F.-5-L* flying boat, 2 Liberty 400 h.p. motors, June 6, 1923, at San Diego; distance, 466 miles, Lieutenant H. E. Halland, *F.-5-L* flying boat, 2 Liberty 400 h.p. motors, June 6, 1923, at San Diego; altitude, 7,438 feet, Lieutenant R. L. Fuller.—New York *Times*, 4 November, 1923.

## NAVIGATION AND RADIO

U. S. Naval Officers Will Participate In Trans-Polar Seaplane Flight.—The United States Navy will be represented in an expedition which will attempt a trans-Polar flight by seaplane over the North Pole under the leadership of Captain Raoul Amundsen next summer. Arrange-

ments have been just completed with the Navy Department for Lieutenant Ralph E. Davison, U. S. N., to take part in the expedition and to command one of the three seaplanes which will make the polar flight.

The request that an American naval aviator take part in the expedition was made a few days ago by Mr. H. H. Hammer, representative of Captain Amundsen in this country. Details of the plans for the expedition were laid before Secretary Denby who approved of participation by a naval pilot. Lieutenant Davison was selected from over thirty U. S. naval aviators who volunteered for the expedition.

The expedition will be transported north to Spitzbergen on shipboard at the end of May in the coming year, where a base of operations is to be established.

A non-stop flight over the Artic regions is not contemplated; the distance from Spitzbergen to Alaska is about 2,000 miles. In the early summer the airplanes will be carried by ship to the edge of the ice pack which will probably be about 450 miles from the North Pole. From here flights will be made to the Pole, where a depot of supplies of food and fuel will be established. The planes which will be used are Dornier Dolphin flying boats especially constructed to take off and land on ice or snow or on the water. They will be equipped with radio sending and receiving sets and will thus be able to keep in communication with the depot ship. By means of a high power radio installation the depot ship will radio to the world the progress of the expedition.

The squadron of three planes will be manned by six men. Captain Amundsen will command one of the planes, Lieutenant Davison will command another and the third will be under the command of someone who remains to be selected.

The desire of Amundsen to have an American naval officer take part in the expedition is an echo of the firm friendship which existed between Rear-Admiral Peary, the discoverer of the North Pole, and the noted Norwegian explorer. This was one of the reasons for his offer of a command of one of the planes to the Navy Department.

Another reason of a more practical nature was the requirements for such an effort. The Artic explorer by air must develop a versatility that is not common. He must have a thorough knowledge of the principles of navigation, be an expert pilot of seaplanes and landplanes, be well grounded in a knowledge of radio communication and be of robust physique.

There are over one million square miles of unexplored territory in the Artic regions between the North Pole and Alaska, and as much as possible of this area will be explored by the party. An attempt will be made to discover whether or not the theory now held by scientists throughout the world that a large continent exists in this region is correct. Other valuable scientific data and information of practical value will be obtained. The feasibility of trans-Polar air routes for aircraft which would link the east and west in air lines over the shortest routes between Northern Europe and the Pacific will also be investigated.

The navigation on such a flight will be of the greatest interest from a naval standpoint. In a region where the magnetic compass is practically useless it will be necessary to lay all courses by the sun and this will be possible on account of the twenty-four hours of daylight. One disadvantage to be had from continuous daylight is anticipated in radio communication. It is well known that greater distances can be bridged by radio at night. The development of the bubble sextant which is used in the United States Navy for navigation of aircraft will in all probability prove a boon to the explorers. This instrument eliminates the necessity for a horizon in making observations of the heavenly bodies. It will probably supplant the artificial or mercurial horizon hitherto used on expeditions in the Arctic.

A thorough reconnaissance of flying conditions in the polar regions was made by the Hammer-Junkers expedition which made flights north of Spitzbergen during the past summer. It found that landings could be effected in numerous places on the ice, snow or water in the region of the pack ice.

The expedition which will leave for the Artic under Amundsen will not attempt the trans-Polar flight to Alaska until several flights have been made in the vicinity of the North Pole where conditions will be studied and bases established. The final effort will be in an airline from Spitzbergen to Alaska across the Pole, to the vicinity of Point Barrow.

The S.S. *Maud* which is now frozen in and has been drifting with the ice pack for two years may establish a contact with the planes. When the flight to Alaska is in progress the *Maud* will send out sledge parties from the ship in an effort to intercept the line of flight. A small plane is also carried on the *Maud* which can make reconnaissance flights at some distance from the ship.

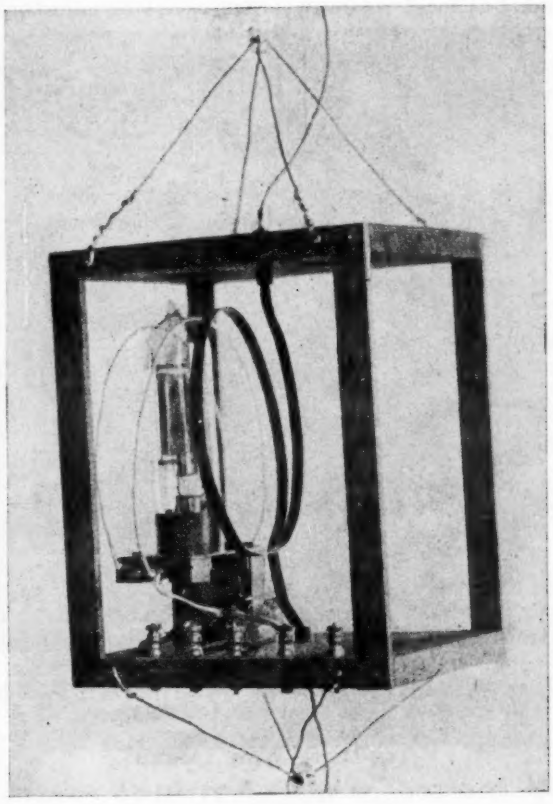
Lieutenant Davison, who has been selected from the many volunteers for the expedition is a native of Missouri. He graduated from the Naval Academy in 1916 and during the war performed duty in the Atlantic Fleet on battleships and destroyers. While a student at the Naval Academy Lieutenant Davison was awarded a prize for excellence in practical and theoretical navigation. He also holds pilots' and masters' licenses for all classes of merchant vessels. He entered the training school for naval aviators at Pensacola, Fla., in 1919 and was subsequently detailed to torpedo plane development work at Hampton Roads, Va. For the past two years he has been stationed at the Naval Air Station at Pensacola, where he is at present on duty. It is expected that he will leave this country early in March of the coming year to join the expedition while it is fitting out in Norway.—*Navy Department Press Bulletin.*

Radio Without Interference.—Down at the Cleveland Park laboratories of the Department of Commerce in the District of Columbia, latterly, if you chanced to pass that way, you would have seen a most unusual contraption which looked for all the world like a queer-shaped tent, made of wires instead of canvas, strung in this direction, that and every other. Query of one of the several scientists who were scurrying to and fro from one part of the novel equipment to the other, regulating appliances and taking records, would have elicited the information and tests of wireless communication on wave lengths of ten meters were in progress.

Had you been interested and inquired further about the novel appartus—such as you probably had never seen before—the Federal investigators would have told you it was a parabolic reflector that was being used in the epoch-making experiments that have paved the way for taking the fear out of interference—the heretofore unconquerable bugaboo of radio communication.

Briefly, the national search and research has developed the ironclad facts that interference between different radio transmitting stations can be reduced by the use of markedly directional antennæ for transmitting and receiving, and by the use of short wave lengths not at present employed. These data are of inestimable scientific importance despite that they demonstrate that directional antennæ are not suitable for broadcasting market reports, music or other form of entertainment. However, they can be employed successfully for the reception of such material that is circulated via wireless. For point-to-point communications—messages sent directly from a certain transmitting station to a definite receiving station—directional antennæ can be employed advantageously at both outgoing and incoming ends.

It is an abrupt departure from the fundamental practices of radiography as hitherto pursued to introduce into active service short wave lengths; for, previously, radio communication has been carried on chiefly by the use of wave lengths of not less than 200 meters. To violate precedent and to attempt to harness very short wave lengths for daily service, were logically the special tasks of Uncle Sam, if for no other purpose than to extend the field of radio research. The use of short waves with the

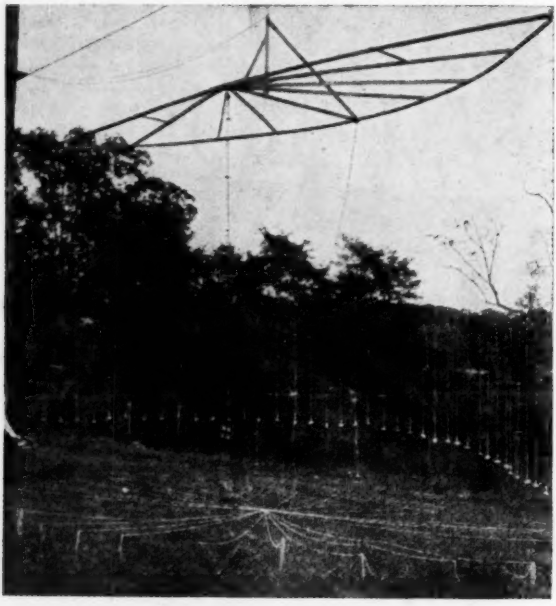


THE TEN-METER TRANSMITTER, CONSISTING OF A 50-WATT VACUUM TUBE, THE ELEMENTS OF WHICH ARE USED AS THE CONDENSER, AND A SIMPLE COUPLING ARRANGEMENT

accompanying reduction in interference, has never been popularized despite that no less an authority than Mr. Marçoni himself recommends it.

Albeit, the national authorities down Washington way have latterly acted on the suggestion of the inventor of wireless, the result being a series of experiments in radiotelegraph and radiotelephone transmission on a wave length of ten meters, using at the transmitting station a reflector composed of short vertical wires arranged as elements of a parabolic cylinder. A

50-watt electron-tube generating set was employed, the capacity between the elements of the tube, together with the grid and plate coupling coils, formed the generating circuit. Two short, vertical, multiple-wire conductors—one above and one below the generating set—were used to radiate the waves from the generating set. A special coupling coil was linked between the two vertical conductors, and the generating set thus was coupled to the system. The generating set with the vertical conductors was suspended in the focal axis of the parabolic cylinder. Each wire of the reflector was tuned separately to ten meters by adjusting its length.



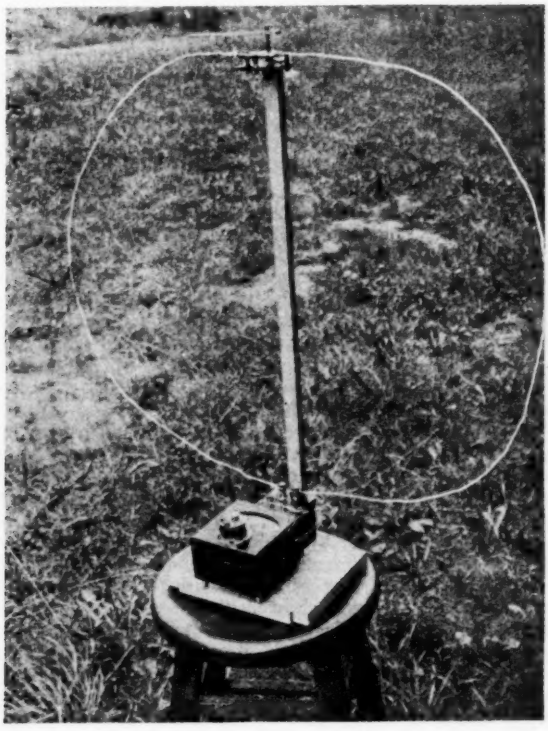
FORTY WIRES, EACH FOURTEEN FEET FIVE INCHES LONG, SPACED ONE FOOT APART IN THE PARABOLIC REFLECTOR FOR MAXIMUM REFLECTION ON A TEN-METER WAVE LENGTH

With all adjustments of the reflector correctly made, satisfactory directional transmission was obtained. The tests demonstrated that at least seventy-five per cent of the radiated power was confined to an angle of forty degrees.

Reduced to brass tacks, the data showed simply that by the use of the parabolic reflector and the short wave length, radio signals and messages could be sent out in a single and definite direction without the conflicting din and confusion of atmospheric disturbances or other forms of interference. The disturbances worked commonly by stray waves caused by atmospheric electricity—occasionally during the summer season these "strays" become so bad as to render wireless communication impossible—were practically eliminated where such short wave lengths as ten meters were used. The small directional antennæ used in conjunction with the

wave length of ten meters markedly reduce the difficulties that emanate from itinerant "strays."

Furthermore, some of the more recent systems of point-to-point communication, such as the sending of photographs by radio and the remote control of machinery and other mechanical equipment by wireless, can be carried on and improved by the directive short-wave transmission. Between points not otherwise readily accessible, radio offers an admirable method of communication, where interference can be minimized. In addi-



RECEIVING APPARATUS EMPLOYED BY GOVERNMENT EXPERTS IN STUDYING THE DIRECTIVE CHARACTERISTICS OF RADIATION FROM PARABOLIC REFLECTOR

tion, directive transmission makes possible extensive radiotelephone and radiotelegraph communication on a large scale with a minimum amount of power as well as with the least interference. As the waves are reflected and radiated in but one direction, a less powerful generating set is required to cover a certain distance than with a non-directive antenna.

A 50-watt electrode tube of the coated filament type was used in the recent Federal tests because it functioned at higher frequencies than any of the others tried out. As the most effective method obtaining directive transmission for short wave lengths was by the use of a reflector in the form of a parabolic cylinder, this was the system followed. The wave

from this variety of reflector is quite similar to a parallel beam of light which has penetrated a small slit in an opaque screen. This reflector was made by suspending forty wires from a frame constructed in the form of a parabola. Each of the wires was tuned to ten meters and spaced one foot apart. The frame was hung from a rope stretched between two poles so that the reflector could rotate through 360 degrees. The suspended wires were insulated from the frame and from each other. The focal distance was made one-quarter of a wave length—2.5 meters or 89.4 inches. The reflector was made like a parabolic cylinder because this form maintains the proper phase relations and obtains maximum reflection.

For receiving signals at distances greater than 150 feet, a receiving set made up of a detector and two stages of audio-frequency amplification was used. An external heterodyne was employed when receiving continuous wave signals. The antenna used in picking up the energy at the receiving apparatus was a single wire tuned to the incoming wave frequency and coupled as its center by means of a special coil to the secondary coil of the receiving set. The total length of the wire used in this antenna was fourteen feet four inches.

Reflections in all cases were imperfect where the lengths of the reflecting wires were not the same. When the reflecting wires were all made the same length and the wave length of the signal source was made slightly shorter than ten meters, the reflecting wires were thrown out of tune and the radiation through the rear of the reflector was equal to one-half that along the true line of reflection. The best possible reflection was obtained when the length of each of the forty reflecting wires was made fourteen feet five inches and these wires were spaced twelve inches apart. All these data were obtained with the reflector having an aperture equal to one wave length. The aperture was then increased to one and five-tenths wave lengths, the parabolic frame being extended with ten tunnel wires suspended one foot apart on each extension. This arrangement resulted in no leakage at the rear of the reflector. Very poor reflection, accompanied by considerable leakage, obtained when every other wire was removed and the total was reduced from forty to twenty. This resulted because the remaining wires were detuned by the removal of their neighbors.

To determine the effect of leakage through a hole in the parabola, ten consecutive reflecting wires were removed with the consequence that heavy leakage occurred. These tests showed that for efficient directive transmission, the source of the waves to be reflected must be placed exactly at the focus; the reflecting wires must be tuned to resonance with the source, while the width of the reflected wave front is dependent on the size of the aperture employed. Strong signals were received at a distance of two miles, using a single-turn coil antenna six inches in diameter.—By D. H. George in *The Scientific American*, October, 1923.

## MISCELLANEOUS

THE AIRPLANE AND COAST DEFENSE.—There is a great deal of misconception about the necessity for the defense of "our long coast line." You cannot hurt a coast line either by shelling or ramming it; both have been tried. If we get away from the catch phrase long enough to see that the protection is for persons and things on the coast, we have already eliminated many vast stretches of rocks and sand which the metaphor evoked. If we further decide that the only persons and things that need protection are those on which the enemy would be justified in expending valuable ammunition and in shortening the accuracy-life of guns which might be called upon to do more serious work, we have focused upon points so relatively few that the "long coast line" appears merely as a misleading exaggeration.

Broadly speaking, there are only two reasons why an enemy should attack our coasts. The first is as an inferior force, intent upon doing military damage and expecting to retire before a superior force can be concentrated to meet it. This is a raid. The other is as a force expecting to obtain permanent lodgment and to maintain itself against any force that may be brought to bear. This is invasion. The nature and limitations of these two kinds of warfare are so distinct and the kinds of protection needed are so different that it is of the utmost importance that we keep clearly in mind which we are endeavoring to guard against.

Points at which military damage can be inflicted by direct bombardment from the sea, while of great importance, are relatively few in number. They are mainly naval bases and the terminal facilities of shipping ports. As a rule these are concentrated in the neighborhood of large cities. Here a few hours' bombardment could seriously interrupt many military operations and compel extensive repairs.

For the defense of strategic points like these the airplane is decidedly inferior to the coast-defense gun with its auxiliary mine fields, and it would be more than dangerous to rely on the airplane alone. The raider has the element of surprise, and may choose his own time and weather. For the last reason alone airplane defense is undependable. Not only is a light haze sufficient to cover an approach, but there is plenty of weather —nights with storm, sleet, and hail—in which bombardment is practicable and in which an airplane simply could not leave the ground. Even on the question of surprise no airplane squadron has yet shown the ability to concentrate on and destroy a hostile cruiser squadron within the time in which serious damage could be done to an otherwise undefended base.

As regards this kind of coast defense, the case of the airplane against the fixed gun is largely built upon the "long coast line" fallacy, implying that we have to provide some sort of defense against the destruction of every summer cottage from Bar Harbor to Palm Beach. We haven't. The destruction of every hotel at Atlantic City would not interrupt any military operation necessary to the prosecution of a war. Although, with a very much shorter line of retreat, the Germans indulged in something of this sort at Scarborough, it is extremely doubtful if on our side of the ocean it would ever be worth the expenditure of ammunition plus the revealing of the presence of the hostile raiders so far from their base. If a squadron of cruiser submarines, for example, should ever be as near our coast, it would be so much more usefully employed in an endeavor to impede our strictly military operations that it is almost inconceivable that it would betray its presence and waste its efforts in a wanton "shooting up" of non-military property.

The only possible justification for this sort of thing, and one which seems to have been in the German mind, is the belief that such destruction of private property will produce a panic among the civilian population, or at least will result in the diversion of military force in the futile attempt to provide adequate advance defense for thousands of places of no military importance. In other words, if the enemy could persuade us to adopt the scheme of scattered defense implied in the "long coast line" theory and to attempt the impossible task of having at every non-essential point sufficient force to meet an attack that might be concentrated at any one point, he would achieve a real victory.

We are now in position to appraise at their true worth arguments like the following from a great New York daily, badly bitten with the idea that airplanes have made all other weapons of warfare obsolete. After making the astonishing editorial discovery that coast-defense guns cannot be used at night, the argument continues:

"How many of these $500,000 guns would be needed to give half-time 'protection' to the coasts of the United States from Eastport, Me., to

Galveston, Tex., and from Puget Sound to San Diego? The number would be large and the cost would be fabulous."

The truth is, of course, that a coast line as such needs no protection whatever, and that coast-defense guns are mounted only to protect points of strategic importance, particularly cities and naval bases, from damage by bombardment. For this purpose they are invaluable, and no satisfactory substitute has been found.

### Landing Party Raids

Besides direct bombardment there is another form of raid, one in which the temporary landing of forces is required. A blocking of the Panama Canal, for example, or the destruction of the naval base at Pearl Harbor would probably be attempted with a landing expedition. It would still be a raid, to be accomplished within a limited time before a superior force could concentrate.

Against this form of attack the aircraft is much more potent. Not only must the enemy have weather suitable for landing, which is of course weather suitable for flying, but the added time gives added advantage to the defense. Operations of this kind are not likely to be tried where defensive land forces can be assembled at short notice, but for isolated points of strategic value, like the two suggested, a well-equipped air base is an important defense.

Even here, however, the ultimate necessity is the ability to concentrate a superior force on the raiders within a reasonable time. The Philippines, for example, could not be left indefinitely to aircraft defense, without provision for reinforcement. In such case the enemy could simply build up his own base at suitable distance and contest control of the air. In such a contest the force capable of indefinite reinforcement would ultimately win over the force diminished by every casualty.

### Invasion

An entirely different problem is presented by the question of defense against an enemy endeavoring to maintain himself on our coast and to wage sustained warfare from the base he may have seized. Here again the "long coast line" fallacy tempts the amateur strategist into the notion that we must somehow be prepared in advance to dispute a landing at every available point, while the enemy is free to choose his own time and concentrate at any point. A little consideration of the limitations under which the invader must work, however, will show that such a scattered defense is as unnecessary as it would be futile.

It is impossible to wage sustained warfare without secure and uninterrupted communication with a base of supplies. The more warfare is developed, the more important this line of communication becomes. Men, food, ammunition, and supplies must go in an unending stream, and an army cut off from its base is an army lost.

The best protection against an invading army, therefore, is an attack against its line of communications, always its weakest link. In the Spanish War the main army of the enemy was Weyler's army at Havana, but this we never attacked. Instead, we forced Cervera's squadron to sea and to its destruction, and when it was certain that Weyler could never be reinforced from Spain he surrendered without a blow. Germany came nearest winning the World War when her submarines threatened the Allied line of supplies across the Atlantic. On land the finishing touch came when American guns commanded the all-important railway line passing through Sedan. Historical instances could be multiplied indefinitely.

Let us, then, take no issue with the strategist who leaps lightly over the enormous difficulties of transportation and lands overnight an enemy force

of 100,000 to 250,000 men on some "undefended" portion of our coast. Let us say boldly that unless it is demonstrated that their line of supplies will remain uninterrupted for an indefinite period we should prefer the larger number. The larger number would use up all available ammunition faster and starve to death quicker. Before the Word War there might have been some hazy notion of such an army being able to bring its own supplies or live off the country, but now every man in the street knows that all the resources of France and England would have availed nothing if the German submarines had been able to stop that steady stream of transports and merchant ships flowing across the Atlantic.

If we have visualized clearly the necessity of an uninterrupted line of communications with some permanent base of supplies, we are ready to ask what part the airplane can play in cutting that line.

The experience of centuries has shown that the most dependable force for cutting a line of communications which crosses any considerable body of water is a fleet of heavy ships which can move to any desired position, and seize and hold that position against any counter force that may be brought to bear. Experience has further shown that the mere possession of a preponderating force of such ships is an absolute guaranty against invasion, for no general will risk an army of invasion which must inevitably be lost if its line of communications is cut. Napoleon looked longingly across the narrow seas, across which he could have easily ferried an army, and, while the Kaiser has not confessed it, he must have had the same feeling of the impotence of his great armies.

It is now proposed to abandon this experience of centuries, to condemn as obsolete the type of force which has always protected the sea powers from invasion, and to intrust the all-important task of cutting the invader's line of communication to the new air force, which has not yet demonstrated, in actual warfare, its ability to handle any such problem.

The submarine failed to solve this problem, in spite of its invisibility and a much greater radius of action than any airplane. What reasonable hope is there for the airplane, sensitive to weather conditions, carrying but one shot of any considerable size and subject to counter-attack in the air? The sinking of a mere replaceable percentage of enemy vessels will not do; the line must be cut, and kept cut. It is entirely possible that the vital part of the line may be wholly outside the limit of flight of any airplane, just as the line from Hoboken to Brest or Bordeaux was wholly outside the range of any possible German airplanes. We need a force that can be moved and maintained anywhere on the high seas, and that force is represented by the battleship.

## Winning Wars

We have dealt only with the problem of coast defense, because it is in that particular field that the advocates of the airplane lay most stress; not upon the necessity for a strong auxiliary force, which would be readily conceded, but upon the extravagant and dangerous claim that tried existing means of defense have been rendered obsolete.

It would be well to note in closing, however, that no nation ever won a war by defending its coasts. Wars are won by breaking the military resistance of the enemy, and this can be accomplished only by a force capable of moving forward, seizing and holding a position, and moving forward to the next. Such a force is represented on land by the slow-moving infantry and on the sea by the heavy battleship.

Throughout the ages countless efforts have been made to win wars by cheaper devices, by swifter forces designed to inflict damage, and then to retire before the slower but superior force. The torpedo-boat, the submarine, and the airplane, all of this school, had a long line of predecessors

both on land and sea. Force of this kind—forces designed to "hit, dodge, and run"—have never yet won a war, and, so far as human prescience goes, never will.—By Sidney Ballou, in *The Outlook*, 24 October, 1923.

THE FLEET FLAGSHIP.—What is the ideal fleet flagship: an ordinary battleship, differing from her consorts only in respect of ampler cabin and office accommodation, or some vessel of novel type, expressly designed for the purpose? This question was often discussed in pre-war days, and had evidently been decided in the former sense, for in each of the belligerent fleets during the war the commander-in-chief flew his flag in a battleship. On the British side the *Iron Duke* served in this capacity until relieved by the *Queen Elizabeth*, while the flagships of the High Sea Fleet were, successively, the *Friedrich der Grosse* and the *Baden*. At the battle of Jutland the *Iron Duke* occupied a station some distance down the line, a position which enabled Admiral Jellicoe to observe the movements of his fleet as a whole more clearly than would have been possible from the van. Similarly, the *Friedrich der Grosse*, carrying Admiral Scheer's flag, was at the outset of the action about midway down the German line.

Even so, neither commander-in-chief had as clear a view of the movements of his own and the enemy's fleet as was desirable. In fact, at more than one stage of the battle vision was so obscured by funnel, powder, and screening smoke that the maneuvers on both sides were rather in the nature of blind man's bluff. With scores of ships all traveling at high speed and covering many square miles of sea, it would in any case have been out of the question for a single pair of eyes to follow every motion in an action lasting several hours, even if visibility had been perfect. To this defective observation must be attributed the denial of that tactically decisive victory which would most probabaly have followed had Admiral Jellicoe been in a position to watch every important maneuver executed by the German Fleet. Whether he would have had better opportunities for such personal observation from a ship that was independent of the battle line proper, and possessed sufficient speed to bear him swiftly to a position from which a clear view of the action could be obtained, is a debatable point. Such a vessel would in any case have come under fire, and, being deficient in protection, might at any moment have been disabled by a lucky hit, causing the commander-in-chief to lose touch with the action at perhaps its most critical phase.

In American naval circles the idea of providing a special type of fleet flagship appears to be in greater favor than on this side of the Atlantic. It has been so far carried into effect that the commander-in-chief of the "United States Fleet" now flies his flag in the *Seattle*, an old armored cruiser of low fighting value; but as this ship is understood to be used for administrative purposes only, the admiral would presumably shift his flag to a battleship before going into action.

Some interesting notes on the subject of fleet flagships are contributed to the *Marine Rundschau* by Kapitänleutnant W. Grassmann, who rightly considers the subject to be one of prime importance. Describing a typical flagship of the war period, he points out that when the commander-in-chief found it expedient to take cover behind armor, he and the principal members of his staff: i.e., the chief of staff, fleet navigation officer, and other fleet specialist officers—were crowded together inside the conning-tower. Here, amidst all the tumult and nerve-racking commotion caused by the ship's own guns, to say nothing of enemy projectiles, and with extremely limited opportunities of personal observation, he had nevertheless to supervise and maintain a rigid control over his fleet of 100 keels or more. It would be difficult to conceive of an environment less well adapted to the performance of his onerous and supremely responsible duties. In the German Navy the importance of minimizing as much as possible up-

roar and smoke in the immediate vicinity of the commander-in-chief was fully appreciated, and a proposal was made to remove the guns from the forward turret and convert this structure into a conning-tower. This plan was rejected on account of the sacrifice of fighting power it involved, and nothing was done beyond fitting a special crow's nest on the *Baden's* tripod mast for the commander-in-chief, who was thus able to obtain a clearer view of his surroundings. Commander Grassmann thinks, however, that it would have been wiser to carry out the original scheme and accept the loss of two big guns, which would have been more than compensated by the improved facilities for controlling the fleet.

All the factors which rendered observation and inter-fleet communication so difficult at Jutland are likely to be magnified in a future naval action. In addition to the battleships, cruisers of various types, and destroyer flotillas, swift aircraft-carriers with efficient torpedo-planes on board will be present, as also large submarines capable of keeping up with the main fleets and using torpedoes and mines against the enemy. Thanks to technical improvement in ships' artillery and to the employment of spotting aircraft, a further extension of the battle range is to be anticipated, while the introduction of trackless torpedoes will tend to increase this range to the limit of vision. Moreover, with these invisible torpedoes in use it will not be possible for ships to avoid them by individual alterations of course: whenever a torpedo attack threatens, the whole line will be compelled to turn away. Smoke screens were resorted to at Jutland, but only in a primitive form. In the next great naval engagement they will be employed on a much larger scale, both as a means of protection and deception. "It seems probable," writes Commander Grassmann, "that in future even a very inferior fleet may venture to accept battle in the knowledge that any unfavorable development can promptly be countered by putting up an impenetrable smoke screen, into which the enemy, whatever his superiority in strength, would scarcely dare to venture." It will therefore be more difficult than ever for the commander-in-chief to keep the picture of battle under his immediate eye. "The fundamental difference between combat on land and combat afloat—in the field, illimitable possibilities of concealment; at sea, a clear field of vision—has ceased to exist."

As regards the future and its requirements, it will never be possible to guarantee the absolute accuracy and rapidity of inter-fleet communications. Conflicting reports from subordinates are and will be unavoidable; discrepancies in position can never be totally eliminated, despite the most careful plotting. There is, therefore, but one way by which the commander-in-chief can make sure of his information, namely, by seeing for himself, either with his own eyes or with those of his personal staff, who are fully apprised of his doubts and intentions. Should this prove impracticable, he must at any rate be in oral communication with those who can see what is going on. The most difficult and yet the most important requirement is that every development in the general situation shall be promptly observed and its significance accurately appreciated. This much assured, there should be no difficulty in communicating the necessary orders to the fleet, for the technical means of doing so functioned quite efficiently even at Jutland.

Commander Grassmann projects a special type of flagship which would, he thinks, be likely to satisfy the demands of a future commander-in-chief. It would be a sort of modified aircraft-carrier, with a speed of 35-40 knots, and a radius of action equal to that of any fleet cruiser. The deck space abaft the funnels would be left clear for flying-off and receiving aircraft. All planes attached to this ship would be exclusively controlled by the commander-in-chief, and their observers would be officers of his personal staff. The ship's armament would be four or six heavy guns (10

or 12-inch) in two superposed double or triple turrets before the bridge; eight to twelve 4.7-inch A.A. guns on platforms in the after part of the ship, with some deck torpedo-tubes, also depth-charge throwers for combating submarines. Armor and under-water protection should be modelled on that of the former German battle cruisers, but with improved defense against direct and indirect (i.e., sub-surface) bomb hits. It would be preferable to have not one, but several ships of this type with the fleet, in order to render identification of the actual flagship difficult to the enemy.

Though a vessel designed on these lines would no doubt be very useful, one cannot help thinking that a simpler and more logical solution of the problem propounded by Commander Grassmann would be reached by constructing an aerial flagship, from which the commander-in-chief could survey the whole area of conflict, free from distraction, and transmit his orders by WT or radio-telephony.—By Hector C. Bywater, *The Naval and Military Record,* 10 October, 1923.

## CURRENT NAVAL AND PROFESSIONAL PAPERS AND ARTICLES

"The Conduct and Handling of Von Kluck's Army from August 10 to September 15, 1914," by Major Arthur W. Layne, Infantry (Dol), in *The Coast Artillery Journal,* November, 1923.

"The Pneumercator Distant Reading Boiler Water Gauge," in *Engineering,* 12 October, 1923.

"Checking the Performance of a Refrigerating Plant," by A. Grow, in *Power,* 6 November, 1923.

"The Armaments Problem," by Archibald Hurd, in *The Fortnightly Review,* November, 1923.

"Will The German Republic Survive?" by Professor Herman Kantorowicz, in *The Contemporary Review,* November, 1923.

# NOTES ON INTERNATIONAL AFFAIRS

PREPARED BY
ALLAN WESTCOTT, PROFESSOR U. S. NAVAL ACADEMY

FROM OCTOBER 23 TO NOVEMBER 23

## ALLIED POWERS AND GERMANY

FRENCH LIMITATIONS BLOCK EXPERT INQUIRY.—Throughout the latter part of October diplomatic discussions continued between the Allied Powers and the United States government regarding American participation in a proposed inquiry by a commission of international experts into German financial resources and ability to pay reparations. The United States government finally refused to take part on the ground that the limitations insisted upon by the French government would make the investigation futile, and that an investigation in which France did not take part would be equally valueless.

On October 13 the British government sent an inquiry to the American Department of State as to whether the proposal for such an inquiry, originally made by Secretary Hughes, still held good. Upon an affirmative reply, the British government secured from France, Italy, and Belgium assent "in principle" to the proposal and proceeded to attempt the formulation of a joint invitation. Subsequent exchanges between Great Britain, France, and the United States developed the fact that France insisted upon sharply limiting the scope of the proposed investigation. First, France did not desire that the commission should consider the legitimacy of the occupation of the Ruhr. Second, France declined to have the commission consider the total amount of reparations unless in connection with inter-allied debts. Finally France declared against any examination to extend beyond the year 1930. In view of these limitations, the United States declined to interest itself further in the plan.

In its note to Great Britain regarding the plan, the United States government had stipulated (1) that there should be no aim to relieve Germany of her due responsibilities; (2) that the fixing of reparations should not be related to inter-allied debts; (3) that the American representative should act merely as a private citizen; (4) that there should be no inquiry unless all the Allied powers consented to participate.

RETURN OF FORMER CROWN PRINCE.—The former Crown Prince Frederick William left Wieringen in Holland early on November 10 and crossed the frontier into Germany on the morning of that day. After spending the night at the home of General von Hindenburg, he continued his journey to his estates at Oels in Upper Silesia. Frederick William had

previously secured the consent of the German government for his return, and it was generally known that he was making plans for departure. At the instance of Great Britain, the Allied Powers made representations to the Dutch government against his leaving Holland, but when the Allied envoys visited the Dutch Foreign Office Frederick had just previously crossed the frontier.

In reply to a protest from the Council of Ambassadors, the German government declared it could see no justification in law or right for opposing the return of a German subject. It gave further assurance that the former Crown Prince had renounced all political claims and pledged himself not to take part in public affairs. In the German press the suggestion was made that Chancellor Stresemann had sanctioned the return as a means of splitting Monarchist sentiment in Germany between the Hohenzollerns in the North and Prince Rupprecht of the House of Wittelsbach in Bavaria.

RUMORED RETURN OF EX-KAISER.—At the time of the return of the Crown Prince there was evidence that the ex-Kaiser had also made plans to leave Holland. The ex-Kaiser, however, denied such intentions, and the German government subsequently gave assurances to the Council of Ambassadors that no permission had been granted or would be granted. Dutch legal authorities were divided as to the responsibilities of Holland in the circumstances. It was recalled that in March, 1920, when Holland had refused to surrender the former Emperor, she was warned of her responsibilities, and that on March 26, 1920, she had declared her purpose "to take all necessary measures to limit the freedom of the ex-Kaiser to the required restrictions."

ALLIES PATCH UP DIFFERENCES.—In view of the return of the former Crown Prince to Germany, the altered situation in the Ruhr, and the refusal of Germany to permit the Interallied Military Commission to renew its supervision of German military measures, the Allied powers in November again felt the necessity of making an effort for concerted action.

On November 6 the Council of Ambassadors sent a note to Berlin demanding that the Interallied Military Commission, which had ceased supervision since the occupation of the Ruhr, be allowed to resume activity at once, with the object of ascertaining whether or not the armed forces in Germany exceeded 100,000. To this demand, Germany replied that in the disturbed internal situation she could not guarantee protection for the commission.

In the subsequent discussion sharp divergence developed between France and the other Allied powers, especially Great Britain. France called for a definite threat of punitive measures, including seizure of further territory and possible occupation of a sea port (Hamburg). At the same time Premier Poincaré declared on November 18 that France intended to hold the Ruhr not only until the fulfilment of reparation terms but until the

fulfilment of all other terms of the treaty. Italy, as indicated definitely by a speech of Mussolini on November 16, supported Great Britain in opposition to direct threats or further occupation of German territory.

CONTENTS OF ALLIED NOTES.—Two notes were later sent to Germany by the Conference of Ambassadors. The first demanded the immediate resumption of operations by the Allied Military Control Commission, with full freedom on the part of the Commission to determine what operations were feasible and necessary. "Should these operations meet with obstruction from the German authorities or German nationals, the Allied governments intend to take measures which may seem to them proper to secure execution of the treaty."

The second note took cognizance of the return of the former Crown Prince, of the latter's renunciation of his rights to the Crown of Prussia and the Imperial Crown, of the German Government's acceptance of the validity of this renunciation and its consent to the return in spite of the danger therein threatened, and also of its engagement not to authorize the former Emperor's return. The note held Germany responsible for the consequences that might result from allowing the former Prince to remain in Germany.

## GERMANY'S INTERNAL PROBLEMS

NATIONALIST COUP FAILS IN BAVARIA.—Bavarian reactionary and monarchist sentiment, which had found expression in the Bavarian Fascisti movement headed by Adolph Hitler, culminated in an attempted seizure of power in Munich on November 8. At a political meeting in the Burbrau Keller, addressed by the Bavarian official dictator Dr. von Kahr, Hitler and his followers entered the hall, took control, and announced the overthrow of the Bavarian Government and the establishment of a new rule with himself in political control and General Ludendorff as military leader. Pledges of support were forced from von Kahr and for a time the "putsch" appeared a success.

On the following day, however, Dr. von Kahr renounced his pledges, declared Hitler and Ludendorff traitors, and, with a strong body of loyal Reichswehr troops under General von Lossow, met and dispersed a force of some 5,000 nationalists assembled in the Odeonplatz, with casualties of eighteen killed and twenty wounded. Ludendorff was arrested and subsequently released on parole. Hitler escaped but was later captured.

The failure of the attempt left Dr. Kahr still in control as dictator, with no meeting of the Bavarian Diet probable until next spring. In the meantime Bavaria will probably follow its present independent policy toward the Federal government, without active opposition.

There are deeper political results, however, of the amateurish and abortive putsch in Munich. It clears the air and definitely eliminates Hitler and his national Socialist followers as well as Ludendorff. At the same time this coup strengthens the real reactionaries of Bavaria, which

is overwhelmingly Catholic and Monarchistic and loyal to Crown Prince Rupprecht, who shrewdly has kept himself in the background. By the bulk of Bavarians Ludendorff and Hitler were considered interlopers, outsiders and non-Bavarians, which they were. Now that Hitler and Ludendorff are removed, the real show has a chance of starting on clean lines.—New York *Times,* 10 November, 1923.

COMMUNIST RULE ENDED IN SAXONY.—In Saxony at the close of October the Federal Government demonstrated its supremacy by accomplishing the overthrow of the Communist Saxon Cabinet, which had defied the authority of the Reich. General Müller, as military representative of the Reich, took possession of public buildings in Dresden and elsewhere, arrested the Cabinet on October 29, and subsequently brought about the establishment of a new Socialist Ministry.

## SEPARATIST MOVEMENT IN THE RHINELAND

ATTITUDE OF ALLIED POWERS.—During the month following the proclamation of a Rhineland Republic at Aix-la-Chapelle on October 20, the outcome of the movement appeared problematical. Coblenz, Wiesbaden, Bingen, Crefeld, Düren, Duisberg and many other towns and villages in the Rhineland and the Bavarian Palatinate were occupied by the Separatists, but their success appeared largely conditioned by the inability of their opponents to organize armed opposition in view of Allied restrictions. The peasantry were in general hostile and took forcible measures to prevent requisitioning of supplies.

In notes sent to France and Belgium on October 31 Great Britain declared opposition to the dismemberment of Germany and her view that the creation of a separate state in the Rhineland was contrary to the Treaty of Versailles. No activities were permitted in the British zone of occupation. The Belgian authorities forced the Separatists to evacuate Aix, Crefeld, and other towns in the Belgian zone. Both France and Belgium, however, assumed a neutral attitude, withholding recognition, but taking the ground that questions of internal political control should be left to the people concerned.

BERLIN PLANS AUTONOMY FOR RHINELAND.—With the abandonment of passive resistance and the decision to cease payment of funds to unemployed in the Ruhr and Rhineland after November 25, the Berlin government cast about for a formula by which the occupied territories could be thrown on their own resources and still held in allegiance to the Reich. Representatives from the Rhineland met government officials at Berlin in an effort to reach such a solution, but up to November 22 without publicly announced results.

Chancellor Stresemann and other champions of the proposed plan to jettison the Ruhr and the Rhineland, so long as they are under military occupation, believe that passing "economic autonomy" is the sole solution to the problem now confronting the Government along the Rhine.

There is an apparent desire to pass along the buck to France and Belgium, leaving the German populace to make its peace with the occupying powers for an indefinite period and permitting the Central Government to wash its hands of the legacy bequeathed it by nine months of passive resistance.

If this solution is adopted it will presage a complete reversal of procedure with reference to reparations; and it is presumed the creditor powers would have to enter into separate agreements with the industrialists regarding deliveries, while the question of gold payment would be protested by Germany on the ground that she was deprived of uninterrupted disposition of her complete economic organization or a demand would be made for a postponement of cash payments until the country's financial situation had sufficiently recuperated to warrant them.

The impending decisions with respect to the Ruhr and the Rhineland, therefore, have a weighty bearing on Germany's foreign relations, as well as on the further trend of internal events.—New York *Times*, 13 November, 1923.

ECONOMIC AGREEMENTS.—Negotiations were resumed on November 20 between Ruhr coal and steel magnates and the Allied Technical Commission in an effort to reach terms for a general renewal of industrial operations. An agreement with Ruhr chemical and dye industries was reached on November 18, providing for a renewal of deliveries in kind to the Reparations Commission. An agreement was also reached with the German Federal Government providing for return of rolling stock to the occupied territory and a future *modus vivendi* between the railroads inside and outside the occupied zones.

## GREAT BRITAIN

BRITISH ELECTIONS SET FOR DECEMBER.—Parliament was dissolved on November 16 and parliamentary elections called on the issue primarily of the Government's foreign policy and its announced policy of a protective tariff, with preferences to imports from British Dominions. In his first election address on November 17 Premier Baldwin declared the following four objects of his proposed tariff on manufactured articles:

First: Raising revenue by methods less unfair to home production.
Secondly: Assistance to industries exposed to unfair foreign competition.
Thirdly: Utilization of the new duties to negotiate reductions in foreign tariffs.
Fourth: The grant of substantial preferences on the whole range of duties to British-produced articles.

The leaders of the two wings of the Liberal party, Mr. Asquith and Mr. Lloyd George, effected a reconciliation and united the party for the election. The Liberal platform condemned the Government foreign policy both in the Ruhr and in the Near East as feeble and ineffective. It opposed the tariff on the ground that it would provide no remedy for unemployment and would hinder rather than encourage foreign trade. Both Liberal and Conservative Parties opposed the Labor proposal of a levy on capital as an emergency measure.

AGREEMENT ON LIQUOR SEARCH AT SEA.—The question of a treaty with the United States permitting search of British vessels for liquor beyond the three-mile limit was presented to the Imperial Conference of Premiers in October and approved by that body. It was reported that the terms of such a treaty had already been framed and that no serious obstacle prevented its early acceptance by both governments.

At the request of the British the rights of the American authorities to detain British vessels suspected of liquor running will not be confined strictly to twelve miles from shore or any other arbitrary limit, but will probably embrace the distance covered by the broad term: "An hour's sailing distance from the American shore," which is reckoned roughly at from ten to fifteen miles. Thus a "twelve-mile limit" will not be mentioned in the treaty, and the Foreign Office cannot be charged with surrendering its traditional principle regarding the limitation of territorial waters.

In this connection the British attach much importance to America's formal recognition of the three-mile limit in questions of general maritime rights as being likely to be invaluable to them. Only recently Soviet Russia agitated for the establishment of a twelve-mile limit for all maritime purposes, but with the American Government supporting the British stand it is expected that the principle will remain as established in international law.—New York *Times*, 30 October, 1923.

NEW AMERICAN AMBASSADOR.—Following the resignation of Colonel Harvey as American Ambassador to Great Britain, President Coolidge announced the appointment of former Senator Frank B. Kellogg of Minnesota to the vacant post. Mr. Kellogg sailed for England in November.

## NEAR EAST

TURKISH REPUBLIC ESTABLISHED.—Constantinople, October 29. (Associated Press.)—The National Assembly at Angora has voted the establishment of the Turkish republic. Mustapha Kemal Pasha has been unanimously elected President.

The Turkish constitution was so amended within the last few months that the proclamation of a republic was merely a matter of form. It provided that Turkey should be proclaimed a republic, with a President elected for a period of four or five years.

The title of president of the Grand National Assembly has been held by Mustapha Kemal, who also holds the post of commander-in-chief of the army.

## FAR EAST

WEST COAST ALIEN LAWS UPHELD.—Washington, November 12.—Laws of California and Washington, which prohibit Japanese and other aliens from owning land in those states, were upheld by the Supreme Court today in opinions handed down by Associate Justice Butler. In the Washington opinion which constituted the principle, Justice Butler denied that the law of that state was in conflict either with the Fourteenth Amendment of the Constitution or with the treaty with Japan.

He held that a state had the authority to prevent ownership of land by aliens who had not declared their intention to become good citizens of the United States or who were prevented from assuming citizenship.—New York *Times*, 13 November, 1923.

INTERNATIONAL CONTROL OF CHINESE RAILWAYS.—Although the Peking dispatches reporting the powers' demands upon China following the Lincheng incident have given prominence to those for the indemnification of the banditry victims and the punishment of the delinquent Chinese officials, these are of minor importance. The crux of the demands is the proposal to place all the Government railways of China under foreign control, and that is what China is fighting, and will continue to fight, tooth and nail.

As to the amount of damages and the reprimanding of the guilty officials, there will be no difficulty in arriving at an agreement, but the internationalization of the railways China will accept only when all means of resistance are exhausted.

Of all modern economic institutions adopted by China the railways are perhaps the most important. Her Government-owned railways aggregate some 4,000 miles, of which the important main lines are these seven: Peking-Mukden, 525 miles; Peking-Hankow, 755; Tientsin-Shanghai, 822; Peking-Suiyan, 317; Shanghai-Ningpo, 118; Lung-Hai, 365, and Shantung, 250.

To the Chinese, international control of so important a part of their national existence is the beginning of the ultimate obliteration of their independence and freedom. The maritime customs, by far the most important source of China's revenue, have long since passed into foreign, especially British, control. The salt gabelle, another great source of revenue, has likewise been placed in British hands.

The deprivation of the Chinese of their railways will, they fear, prove a definite movement toward international control of nothing less than China itself.

The plan for the internationalization of the Chinese railways was proposed by Great Britain, and has been, after some hesitation, it is said, accepted by the United States.

Meanwhile the prevailing sentiment among the Chinese is growing more and more anti-foreign, and particularly anti-British. They are convinced that the day is passed, thanks to the World War and the Wilsonian doctrine of self-determination, when the great powers could treat China as they pleased, when the murder of a foreign missionary or merchant would bring upon them a retribution such as would strike terror into their souls.

They know that the powers, in deference to the high-sounding ideals they had themselves heralded, dare not handle them as roughly as they were wont to do in the earlier days.

To all appearances the new proposal for the international control of the Chinese railways is not going to have smooth sailing, although it may eventually be adopted with such modifications as China may manage to wrest, if the powers act vigorously and in unison.—*Baltimore Sun,* 11 November, 1923.

## LATIN AMERICA

TACNA-ARICA DISPUTE SUBMITTED TO PRESIDENT COOLIDGE.—Washington, November 13.—Chile and Peru, through presentation of their arguments in the Tacna-Arica case today to the President of the United States, selected by them as arbitrator in this thirty-year controversy, brought the ancient dispute one step nearer final solution.

There remains the filing by Chile and Peru of their counter-replies, for which they will be allowed three months, and then Coolidge, as arbitrator, will determine the question, and his decision will be final, whether a plebiscite shall be held in the Provinces of Tacna and Arica to fix their permanent sovereignty or whether the matter shall be decided in some other manner.

Chile argues in favor of a plebiscite to decide whether Tacna and Arica

shall be hers or be returned to Peru, while Peru opposes a plebiscite, holding that conditions have so changed since 1894, the date when the plebiscite should have been held, that it would be impractical and unfair to hold it "in the present circumstances."

Chile holds that a plebiscite not only would fufill the provisions of the Treaty of Ancon, which ended the War of 1879-83, but also would conform to the doctrine of the "consent of the governed," which is in harmony, the brief states, with the democratic principles controlling popular government today.

Peru, on the other hand, asserts that "the only just plebiscite, preserving the legal and moral interests of both Chile and Peru under the Treaty of Ancon, would be one which would reflect the conditions as to population prevailing in 1894.

The Peruvian brief declares that the territory obtained by Chile at the end of the war of the Pacific, not including Tacna and Arica, constituted "the greatest war indemnity the world has ever known," and refers to this fact to prove that even these enormous advantages were an insufficient inducement to cause Chile to comply with the terms of the peace treaty, which she herself had imposed by the sword.

Peru asserts that the population of the Provinces of Tacna and Arica, even on the admission of Chilean authorities, down to the year 1910 at least, was overwhelmingly Peruvian, and that a plebiscite, if it had been held in 1894 or about that time, would have been decisively in favor of Peru.—New York *Times*, 14 November, 1923.

# BOOK REVIEWS

## THE MERCANTILE MARINE. By E. Keble Chatterton, late Lieutenant-Commander, R. N. V. R. Little, Brown, and Company, Boston, 1923. $5.00.

A Review by Rear Admiral N. C. Twining, U. S. Navy

The author, in his Preface, calls this volume "an attempt to trace the history of the Mercantile Marine, and to show the reader how much we owe to our ancestors for the ingenuity, enterprise, courage, and perseverance by which the Merchant Service has been built up for the good of nations, the increase of trade and the spread of civilization."

While the Mercantile Marine treated is, as might be expected, largely that of Great Britain, a generous portion of the book is devoted to the history of the commercial navies of other countries and peoples from those of the Phoenicians and Romans of ancient times; the Venetians, Pisans, and Genoese of the Middle Ages, which antedated the sea services of the British Isles; through the Dutch, Spanish, and French, which successively arose, flourished, and shrank away as competitors of the British; down to the American and German marines which have, in the recent past, contended with the British for first place in the world's carrying trade.

Notwithstanding that the mercantile marine does not constitute a "service" in the sense in which we understand the word as applied to a combatant navy, it is, none the less, an entity with a certain degree of coherence and continuity, governed by laws, customs, and traditions, and having a history with episodes not less glorious, if less well known, than its more picturesque sister service. It is well that an author of Mr. Chatterton's knowledge and narrative skill has chosen to spread before us a record of facts which shall illustrate the high value of the part played in the past by the merchant navies of the world in spreading civilization and advancing the cause of humanity.

Civilization has not always been spread nor the cause of humanity advanced without some temporary set-backs, some bickerings and bloodshed; one might, from a superficial study of the history of sea trading, conclude that it had been more fruitful of rivalries, contentions, and conflict than of brotherly love, harmony, and peace. A little deeper study and a little more reflection, together with an attempt to visualize what the world would have been to-day had there been no inter-communication among peoples, exchange of commodities, nor contact of cultures, will make it clear that the establishment and development of sea-borne trade have played a tremendous part in the progress of man and that the mer-

cantile marine can show a handsome balance on the credit side of its ledger. Some there be who deplore "progress" and feel that it is a term not synonymous with "improvement"; it may be so, but mankind will not stand still; as Mr. Chatterton says, ". . . . human aspirations cannot be gainsaid. Progress will not be denied. Man is not content to remain where he was, and that is the basis of the whole story."

So far as Europe and the western world are concerned the Phoenicians were the first deep-sea navigators and traders. They were followed by the Greeks and Romans whose vessels plied the waters of the Mediterranean, with an occasional venture into the Atlantic; in the centuries before the Christian era, and for many centuries later, the history of the mercantile marine is largely a history of the trading ventures of these peoples and of the Arabs.

With the growth of the Greek sea trade grew up also the necessity for protecting it against attack; for, as the author says, "one of the oldest professions is that of piracy"; where there exists anything worth having there is also a potential robber, and as soon as valuable commodities began to be transported by water, sea-robbers—pirates—came into existence. For protection against them vessels especially built and equipped for fighting were provided, and we find "the Greeks constructing two distinct types of craft. . . . First there was the swift moving galley, relying chiefly on oars. She was built for the purposes of fighting. . . . Secondly there was the slow-moving, big-bellied craft, relying almost entirely on her one mast and sail, which was used for the purpose of trade. . . ."

From such small beginnings the history of sea-borne commerce and its protection, of merchant marines and navies, has progressed down to the present day. Piracy continued to be a thriving business until very recent times. Trade rivals were enemies who, during the early history of commerce, did not confine themselves to diplomatic and legislative methods of fighting as they do in these days but, notably in the days of the rivalries of Venice, Pisa, and Genoa, were given to the practical methods of direct action; in those days it was not alone "north of fifty-three" that the laws of God and man did not run. National enemies made sea-borne commerce an object of attack no less in ancient and medieval times than today.

Fighting navies were formed for the purpose of protecting trading vessels against all these enemies, and had no other purpose. As it was in the ancient days, so is it in our own times: without a mercantile marine to protect, navies would not exist; without navies to protect them, mercantile marines could not survive.

The extent to which Great Britain may trace her present commercial prosperity to a humble origin in fish is thus stated by the author: ". . . . on the herring the nations of the North have prospered, built their mercantile marines, grown rich, created their navies and expanded commercially. . . . The fishing industry developed shipbuilding, created a seamanhood, spread the fascination of the sea as a career, and thus handed down from century to century a great and wonderful school, from

which in Tudor times were to be obtained the crews who ventured forth with Drake . . . . had it not been that for hundreds of years the Englishmen had been out fishing, there would have been no expansion of England either commercially or politically."

The history of the merchant service of England during the seventeenth and eighteenth centuries is almost exclusively a history of the East Indiamen operated by the Honorable East India Company. This company, first formed in 1599, received from Queen Elizabeth, for a period of fifteen years, the privilege of a monoply to trade with the East Indies. This monopoly, extended and prolonged from time to time, did not come to an end as to India until 1814 and as to China until 1833. While the granting of this monopoly had the immediate effect, as the author states, "of stimulating shipbuilding affairs" and while "the Dutch and English began to improve their ships as well they might for so long an ocean voyage," it had, ultimately, the bad effects that flow from all monopolies. The East India Company maintained a service that is famous for excellence; it prospered exceedingly, paid huge salaries, wages, bonuses, and pensions to its employees, but, after the effect of the first stimulus had been felt, it did but little in the way of improving types and designs of ships and was generally conservative and unprogressive, Other countries were forging ahead in these particulars and, as soon as the monoply was terminated, English shipping showed an immediate and marked advance in these matters, in speed of voyages, and in expansion of trade.

The influence of trade routes on the course of history and of political and social development is brought out by the author with great clearness. ". . . . the trade routes of the world are the lanes along which history is constrained to flow." The reader will remember that, although coastal voyages between the Mediterranean and the north of Europe were common enough prior to the fifteenth century, dating back, indeed, to the times of the Phoenicians, it was not until 1442 that Madeira and the Azores were discovered and that it was only in 1486 that the Cape of Good Hope was rounded and the sea route to the Indies opened up. The great impetus given to trade with Africa and eastern Asia by those discoveries was, a few decades later, paralleled in another direction by the discovery of the West Indies and the American continents.

It is plain that, as Mr. Chatterton says, "The success of Prince Henry the Navigator's influence, the achievement of Vasco da Gama, completely revolutionized the trade routes of the world, transformed the European mercantile system, made the gate of commerce not Venice but Lisbon, transferred the center of progress from the Mediterranean to the Atlantic; and the discovery of America accentuated this new condition still further."

The sea-trading of the Atlantic which was stimulated and, indeed, practically created, by the discovery of the Cape of Good Hope and the sea route to India, quickly grew to vast proportions and Great Britain,

Spain, France, and Holland contended for its control. The wars of the sixteenth, seventeenth, and eighteenth centuries were, as the author says, "at heart the struggle for the possession of overseas commerce" and, as he further says, "the recent war with Germany was animated by the same cause." The end of the great war, which has been variously called "the war to end war" and "the war to make the world safe for democracy," has not, apparently, brought the perfect accomplishment of either of those objects nor has it effected a termination, or even a suspension, of the "struggle for possession of overseas commerce." The author thinks not, at any rate, for he says, "When Spain falls out, the Dutch take her place. When they cease to be competitors, the French become the pacemakers, to be followed by the Germans; and now that the latter have disappeared almost entirely from the sea, the United States ships of commerce will maintain this ancient contest." Will the United States tread the path worn by the feet of its predecessors?

It is a matter of interest to note how, in respect of merchant services, as in other economic fields, a demand has created a supply. It was the demand for transportation to the Holy Land created by the Crusades in the eleventh, twelfth, and thirteenth centuries that called into being the merchant service of Venice, the largest of its time. It was the demand for food fish, abounding in the North Sea, that brought about the real beginning of the British mercantile marine as well as those of the Scandinavian countries, Holland, and the Hanse Towns. From similar causes came later the flourishing East India service, the fast mail packets, and the American clipper ship trade. The "gold rushes" to California and Australia in the mid-nineteenth century caused a tremendous, if temporary, increase in the means of sea transportation.

On the other hand, as the author points out, trade has been developed and the mercantile marine expanded by enterprise in seeking new markets, creating new demands, no less than by providing for obvious and existing demands. This is again an illustration of the fact that "human aspirations cannot be gainsaid . . . . man is not content to remain where he was."

Accustomed as we of the nineteenth and twentieth centuries are to rapid developments and great changes it is a little hard to realize the fact as set forth in this volume that most of the changes and improvements in the material of the merchant service as well as of navies have taken place within a space of time comparatively short. For many centuries after the beginning of maritime history the commerce of the world was carried on in vessels differing not greatly in size and type from those of the Phoenicians, Greeks, and Romans of the early days. Even the East Indiamen, as late as the end of the eighteenth century, although described by the author as "the backbone and beauty of the British Marine" and "frigate-built," were "stately rather than fast sailers, badly designed, requiring much ballast, and essentially but little improved since the sixteenth century." At this time the French had taken the lead in

ship design and a little later the American influence was felt in the way of improving the speed and sailing qualities of both merchantmen and men-of-war. In the fine Blackwall frigates of England, built from 1837-75, the successors of the stately but dull-sailing East Indiamen; in the fast mail packets of the early nineteenth century; and in the American designed and built clipper ships of the mid-century and later, the acme of excellence in sailing ship design and construction was reached. But just as the sailing ship was reaching the perfection of type, the advent of steam foreshadowed the doom of the sailing ship.

The first vessels to cross the Atlantic, steaming all the way, were the paddle-wheel steamers *Sirius* and *Great Western* of 703 and 1,325 gross tons respectively, which crossed in April, 1837, taking eighteen days and fifteen days for the westward passage. From these wooden-hulled vessels to the steel *Leviathans, Majestics,* and *Aquitanias* of today is a long jump in the point of size and speed, but a short one in point of time.

Mr. Chatterton calls particular attention to the fact that it was not until the nineteenth century that marked differences between merchant ships and men-of-war were established. Originally of different design, as was seen in the days of the Greeks, when oars were the primary propelling power of fighting ships and had only a secondary place in cargo vessels, increased length of voyages and enlargement of sail power caused the elimination of oars and led to similarity of type which persisted until the advent of steam brought about an evolution along different lines. In the seventeenth and eighteenth centuries ships and men were much the same in both services; in fact, as the author puts it, "the merchantman was as much privateer or pirate as he was freighter. He had to be a fighting man whatever else he might be." The author relates several stirring stories of conflicts between merchantmen and men-of-war in which the latter did not always come off the victor.

The advent of steam, together with international agreements and aggressive action against piracy, sealed the fate of that ancient profession early in the nineteenth century; privateering, last extensively pursued during the Napoleonic wars, was practically abolished after the Crimean War; since that time national enemies have been the only ones trading vessels have had to fear until, during the late war, when Germany attacked belligerent and neutral alike, the merchant ship had again to arm for defense and again to become a fighter. This condition existed for the better part of four years, but a like and even more trying condition existed for forty years at the end of the eighteenth and beginning of the nineteenth centuries when trading vessels were subject to attack by pirate, privateer, and warship; but the merchant service "carried on" just as it did in the late war and "the merchantman still went about her business, undaunted and undismayed."

One cannot read the history of the merchant service of the world without being impressed by two important facts:

(1) That a flourishing sea trade in national ships is highly beneficial to the general prosperity of a country.

(2) That encouragement and protection must be given to such trade not only by means of a navy but through laws which shall make it profitable to those engaged in it.

The author enters into few details of the legislation by which England has, throughout her history, fostered the growth of her mercantile marine and thereby advanced her national prosperity. It is sufficiently clear, however, that, by means of navigation laws, monopolies, subsidies, and preferential treatment, she has, in the course of her history, made possible the establishment and development of her overseas trade. It was to the great benefit of the realm that the East India Company was enabled to establish and maintain a thriving trade, by means of the monopoly granted to it, the chief objection to which was its too long continuance. Subsidies granted to mail packets encouraged the building of fast sailing vessels, built up the ports, stimulated travel, and gave employment to hundreds of artisans. The author speaks thus of the packet service of the early eighteenth century: "It was a separate method of causing to grow up a body of fine seamen; it was one of the best schools for encouraging navigation . . . . ; and generally it was one of the great influences toward building up the Mercantile Marine."

In 1771 we find the British government granting "a bounty of thirty shillings a ton for seven years . . . . to all decked vessels of from twenty to eighty tons, provided they were of British origin and ownership and engaged in the herring fishery." The Cunard Steamship Company owes its origin to a mail contract with the British Government, a contract which was first made for a period of seven years and carried a subsidy of £81,000 a year. The Royal Mail Line, in 1840, obtained a ten-year contract for carrying mail to the West Indies. This contract caused the immediate construction in British yards of fourteen steamships at a cost of about £1,000,000 sterling. The subsidy for the first ten years was £240,000 a year; it was gradually reduced to £85,000, and was finally abolished in 1905.

No doubt the sponsors of the shipping concerns and the share holders therein profited financially by the government aid extended to them, but the nation profited as well in the stimulation of shipbuilding and allied industries, in the flow of trade and travel that resulted from the establishment of trade routes, and in numberless other ways. Is there not here a lesson which the United States might well con?

America, in its comparatively short history, but with the English blood in its veins and with English traditions behind it, has, until recent years, had a deep-sea mercantile marine of respectable proportions and excellent quality; Mr. Chatterton gives it the credit of having been "during the 'forties and 'fifties . . . . in many respects superior to the British." The first clipper ship, the *Anne McKim* of 493 registered tons, was built in Baltimore in 1832 and was the forerunner of a splendid group

of ships which carried the American flag to the Far East and were the fastest ships—steam or sail—of the period.

It was the advent of the iron ship, together with the loss of shipping and its transfer to neutral flags during the Civil War, that caused the decline of the American merchant marine from which it did not recover until the late war gave it a new birth. Whether its re-incarnation is to be permanent or whether it will again die a quick or a lingering death are questions that are still on the knees of the gods—and Congress. If we may trust the teachings of history we may surely forecast its early death unless, through wise legislation and financial assistance, it is enabled to survive the critical period of its infancy. Mr. Chatterton thinks that the great effort of the United States in shipbuilding under the spur of war demands shows that we had made up our minds to have a commercial marine; "America had been a long time learning its lesson, but there was no question that she had learned. Therefore it is not to be expected that she will let this hardly-acquired realization be forgotten." He welcomes the prospect of American competition in sea trade and believes that, reading from the pages of history, we should have learned that it is better to welcome competition rather than to hinder it by laws "which may do good, but may also cause international friction, more dreadful wars, and do little for the advancement of civilization and the attainment of noble aims."

If the United States is to have a mercantile marine that shall be a credit to the flag and shall be a "service" in the highest sense of the word, we must have something more than ships and hap-hazardly chosen personnel. Let us reflect on this extract from *The Mercantile Marine:*

"There are many who believe, rightly, that the Mercantile Marine of any country should be run with fixity of employment and the same lofty standard as the fighting navies. If that were done, the grade of officers and men would be as high as it was in the days of the East Indiamen. Let it be realized what a nation's merchant ships mean to the country, and then the public will concede it proper respect and give to that service its best sons."

## SECRETARY'S NOTES

**Membership**

Present Membership, 4656. Changes since January 1, 1923: New Members, 216. Resignations, 78. Deaths, 25. Total Increase, 113.

**Subscription Rates**

In order to bring the subscription rate more nearly in line with the cost of publication, the Board of Control has increased the subscription rate to $5.00 per year. A special rate of $3.50 per year is made to members only (not available to societies or organizations) in order that they may send subscriptions for the PROCEEDINGS to their relatives and friends. (Foreign postage 50 cents extra in all cases). Subscriptions are automatically discontinued at expiration.

**Bound Copies**

For a number of years, members desiring bound copies of the PROCEEDINGS have been able to obtain these for a slight additional payment, recently amounting to $4.00 per year. The actual additional cost to the Institute is approximately $16.97 per member per year. The net loss of approximately $13.00 per member per year has been borne by the Institute. As the number of bound copies per issue is only seventeen, the Board of Control has decided to discontinue furnishing bound copies, effective 1 January, 1924.

**Foreign Postage**

For a number of years members residing abroad have been paying fifty cents extra per year for foreign postage, which does not quite cover the additional cost to the Institute at the present time. Life members residing abroad have not heretofore made this payment. The Board of Control has decided that all classes of membership shall be treated on the same basis, and life members residing abroad will, therefore, be required to pay fifty cents per year for foreign postage, effective 1 January, 1924.

**Articles** The Institute desires articles of interest to all branches of the service, including the reserve force. Non-members as well as members may submit articles, and authors receive due compensation for articles published. Compact, well digested articles are more likely to be accepted for early publication. In accepting articles for publication, the Institute reserves the right to have such articles revised or rearranged, where necessary, in order to bring them up to the required standard of articles published in the PROCEEDINGS—the cost, if any, to be deducted from the compensation due the author.

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**Book Reviews** As soon as practicable after the publication of books on subjects of professional interest, the Institute aims to publish authoritative reviews of them.

**Address of Members** In the past, many errors have resulted from the habit of changing an officer's address as soon as his transfer orders are published in the papers. No change will be made in the future except upon receipt of the Navy Directory, or notification by the member concerned. Reliance upon the former method may, in extreme cases, mean a delay of almost four months.

To insure the prompt delivery of the PROCEEDINGS and other communications from the U. S. Naval Institute, it is essential that members and subscribers *notify the Secretary and Treasurer without delay of every change of address.* No responsibility can be accepted for failure to receive the PROCEEDINGS, where members fail to comply with this rule. Changes of address should reach the Institute by the 25th of the month, to be effective for the issue of the PROCEEDINGS of the following month.

H. G. S. WALLACE,
*Commander, U. S. Navy, Secretary and Treasurer.*

## SUGGESTED TOPICS FOR ARTICLES

Aviation—Its Present Status and Probable Influence on Strategy and Tactics.
The Anti-Aircraft Problem from the Navy's Viewpoint.
Co-ordination of the Naval Air Force with Other Naval Forces.
Naval Bases, Their Number, Location, and Equipment.
Military Character.
The Relation of Naval Communication to Naval Strategy.
Proportion of National Budget Which Should be Devoted to Naval Expenditures.
The Necessity for Having a Fleet.
Organization of Fleet for War.
The Offensive and Defensive in Gas Warfare.
The Best Protection from Gas Attack.
Naval Gunnery of Today, the Problems of Long Range and Indirect Fire.
Physical Factors in Efficiency.
The Relation between the Navy and the Merchant Marine.
America as a Maritime Nation.
Relation of the Medical Department to a Plans Division.
The Place of Mines in Future Naval Warfare.
A Mobilization Program for the Future.
Morale Building.
The Mission of the Naval Academy in the Molding of Character.
How to Best Educate and Convert the American People to the Need of a Strong National Defense.
The Navy in Battle; Operations of Air, Surface, and Underwater Craft.
Navy Spirit—Its Value to the Service and to the Country.
Based on a Major Ship Strength of Eighteen Dreadnaughts, What Do You Consider a Balanced Navy?
The Future of the Naval Officers' Profession.
The Naval Officer as a Diplomat.
Is the Present System of Training and Education for Officers Satisfactory and Sufficient?
The Rôle of the Navy at Peace.
Training Naval Personnel During the Next Ten Years.
Six Years of Promotion by Selection in U. S. Navy. Its Effect Upon Discipline and Morale.
The Employment of Retired Officers Separated from the Service by Reason of the Age in Grade Feature of the Existing Selection Law.
What Measures Should be Adopted to Create and Maintain a Balanced Enlisted Personnel of 120,000 Men?
Our Future Naval Policy Based on Existing International Treaties.
The Future Naval Continental Shore Establishments.
Shore Duty for Enlisted Men.
The Limits of Specialization in Naval Training.
The Effect of the 5-5-3 Ratio Upon U. S. Naval Strategy in the Eastern Pacific.
Armor or High Speed for Large Surface Vessels?
Airplanes and Submarines Versus Super-Dreadnaughts.
The Navy's Relation to the Nation in World Affairs.